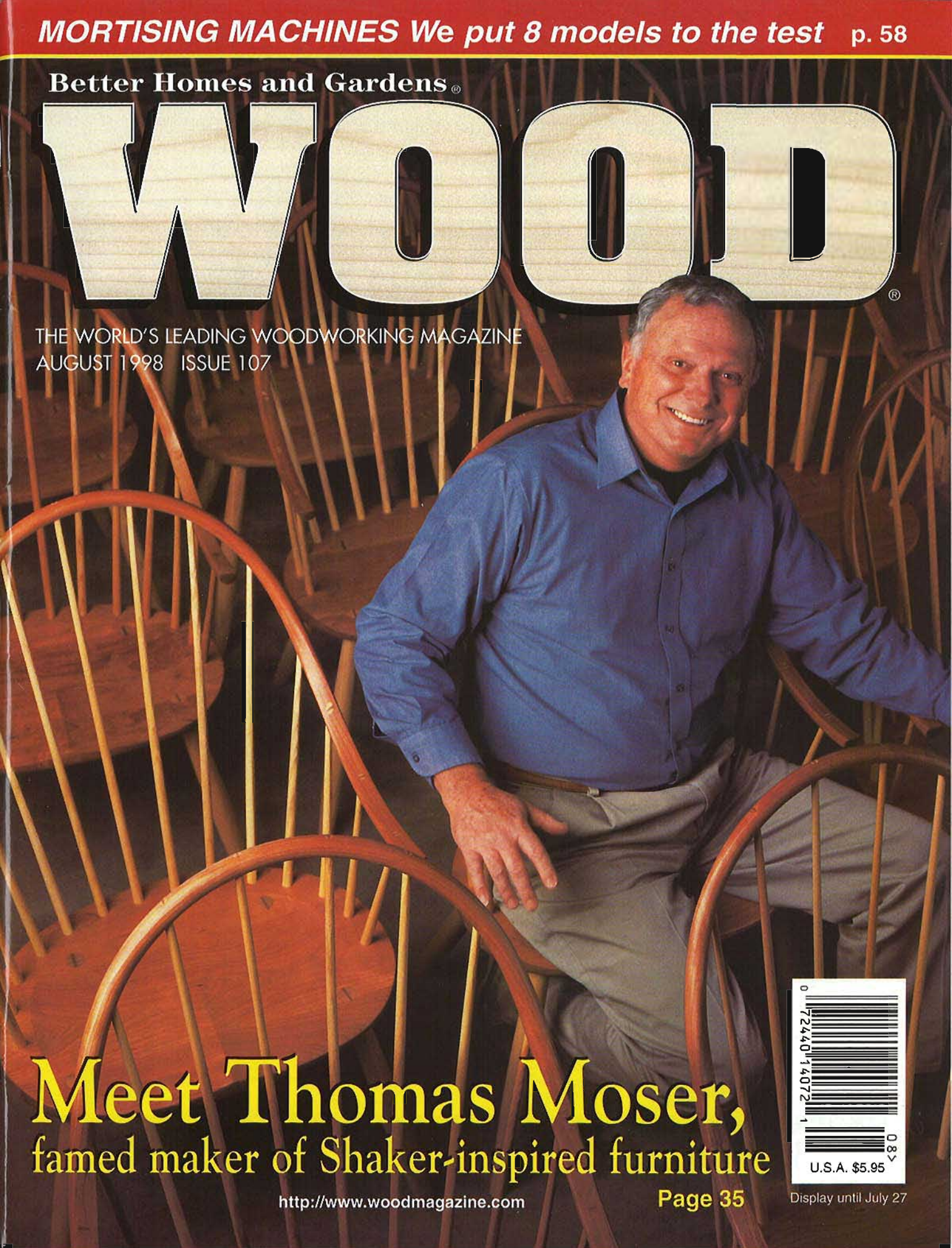
MORTISING MACHINES We put 8 models to the test p. 58

Better Homes and Gardens®

WOOD®

THE WORLD'S LEADING WOODWORKING MAGAZINE
AUGUST 1998 ISSUE 107



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famed maker of Shaker-inspired furniture

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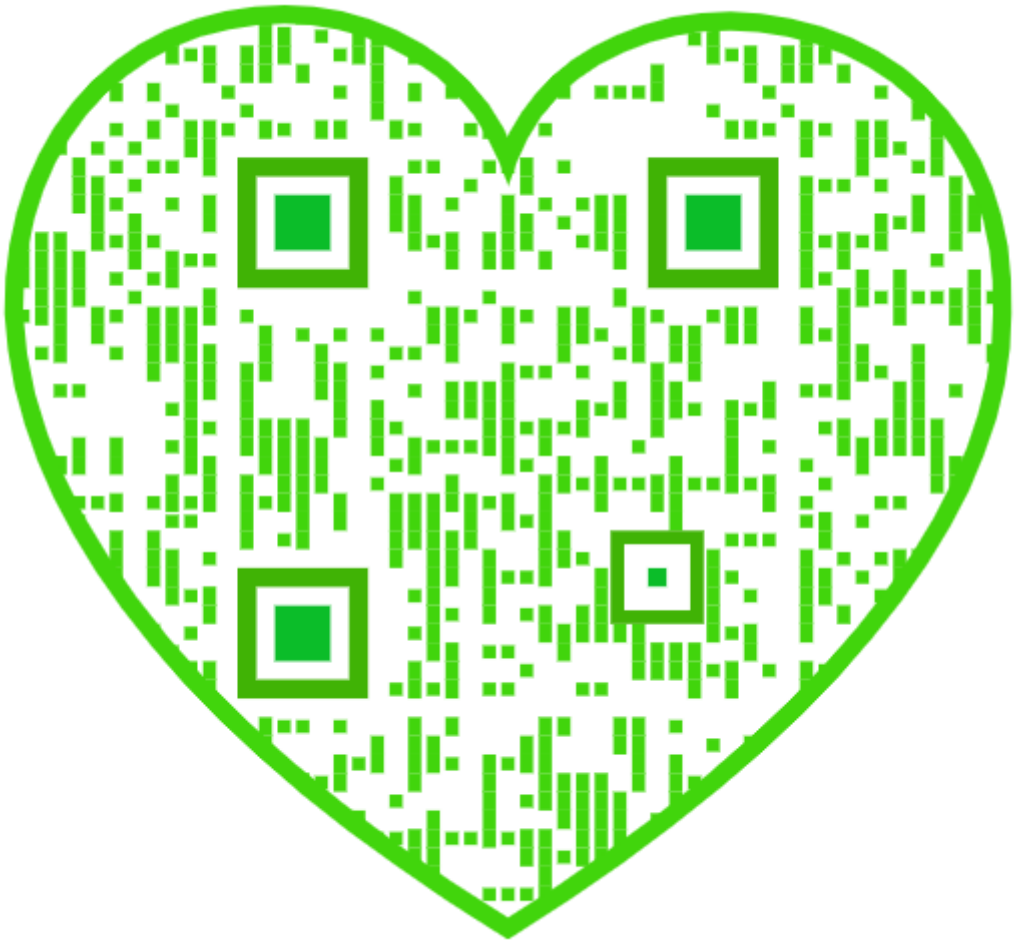

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ISSUE NO. 107 AUGUST 1998
This issue's cover wood grain: white cedar

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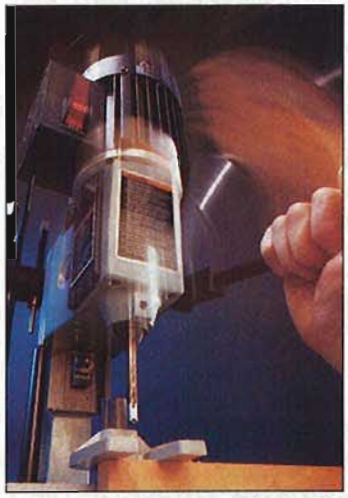

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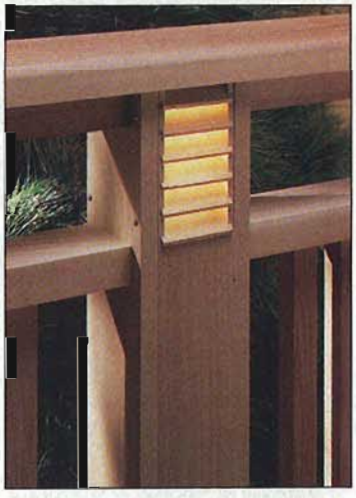

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Contributing Editors KIM DOWNING, DAVE HENDERSON, LORNA JOHNSON, ROXANNE LeMOINE, BOB McFARLIN

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THE EDITOR'S ANGLE

Two good deeds I wish we had done earlier!

WOOD magazine staffers Jim Harrold, Chuck Hedlund, Pete Stephano, and I look on as three residents of The Homestead Living and Learning Center enjoy posing behind The Snow Family.

About a decade ago, my in-laws had a death in their family that required them to be away for Christmas. After some discussion, the rest of us decided to wait and celebrate when they returned. Doing that turned out to be the luckiest thing we have ever done.

Sitting around the kitchen table, we decided we'd like to somehow make Christmas less commercial. I forget who it was, but someone mentioned going to a local residential care facility on Christmas Eve to spread some cheer. We baked some cookies, the kids made and then decorated enough greeting cards for all of the facility's residents, and then we piled into my brother-in-law's van.

How could we have known what we were about to experience that day? As we met and chatted with the people at the facility, we all were filled with a sense of joy that had eluded us for the past several years. We've gone back every year since then, and seeing our new-found friends continues to be the best part of our Christmas.

Recently, the *WOOD®* magazine staff and I had a similar experience. For some time now, we have been wanting to do something to make a difference in our community, and this year, out of the blue, a former secretary of mine called. Marge now works for The Homestead Living and Learning Center near Des Moines. (This organization operates an agricultural-based living and learning community for adult Iowans with autism.) She wanted to know if we had any extra outdoor Christmas ornaments that were looking for a new home.

As it turns out, we did have, but they were in pretty rough shape. So several of us spent some time one afternoon touching up and repairing the ornaments.

As you can see in the photo, the residents reacted favorably to the colorful ornaments that we presented to them. And according to Steve Mueller, executive director of The Homestead, the ornaments helped raise the spirits of families and staff, too.

I relate these experiences to you because I'd like to encourage you to use your woodworking talents to bring joy to those you know, and even those you don't. There are plenty of opportunities to do good. And believe me, by getting involved, you will receive much more than you give.

Larry Clayton

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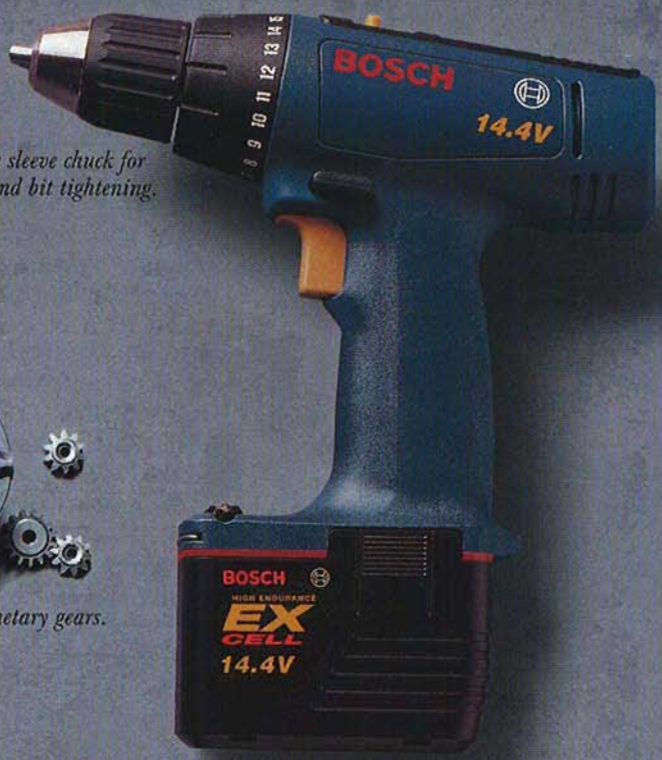

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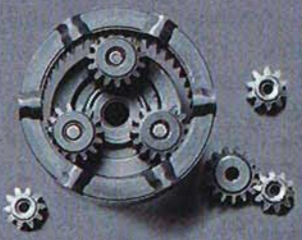

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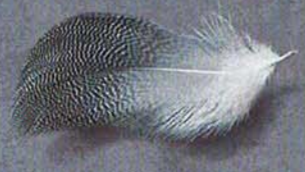

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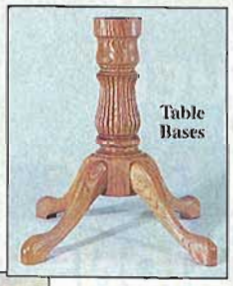

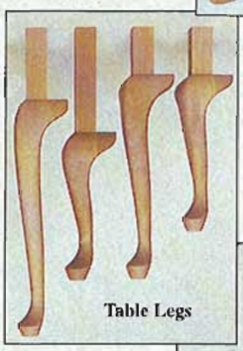

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Asst. Advertising Services Supervisor PAT HENDERSHOTT

Display Advertising: 333 N. Michigan Ave., Suite 1101, Chicago, IL 60601 Phone: 312/853-2890 FAX: 312/580-7906
Eastern Advertising Manager JAMES N. FORD
Western Advertising Manager WILL MURPHY
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Direct Response Advertising: 1912 Grand Ave., Des Moines, IA 50309-3379 Phone: 515/284-3785 FAX: 515/284-3343
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TALKING BACK

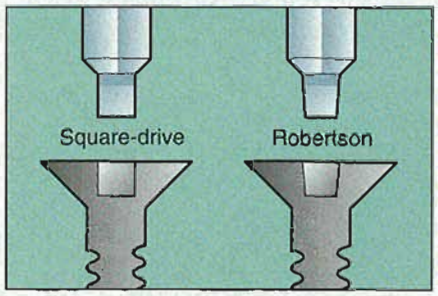
A screwy difference between countries

After reading in issue #103 of *WOOD* magazine about "Robertson" and "square-drive" screws, I decided to do some research. To my surprise, I discovered that they are actually two different products.

It turns out that when Canadian Peter Lymburner Robertson patented his screw head and driver, he specified that they only be manufactured in Canada. After its introduction, though, U.S. woodworkers discovered the advantages of the Robertson screw and began requesting it.

Because of trade limitations, U.S. manufacturers developed the "square-drive" screw and driver. The two products are just slightly different. The Robertson's socket has a slight inward taper, and the square-drive screws have square-cornered sockets as shown *below*.

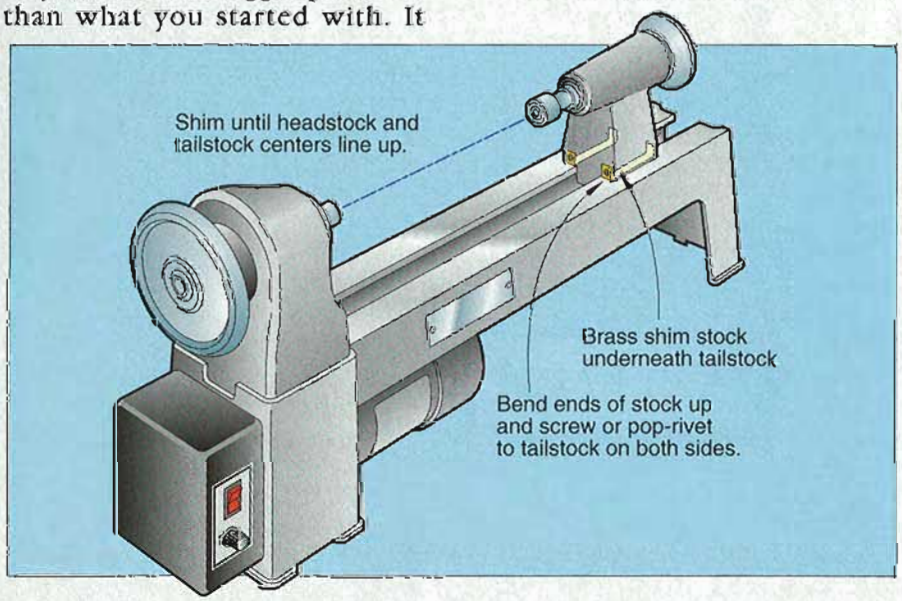
—Tom Rawley, Cambridge, Ontario



It's better to shim than punch tailstock

I was shocked when I read the article, "Tuning Your Lathe" in issue #101. Shocked, because it's a bad idea to center-punch the tailstock to raise it. I have been in machine repair for 37 years, and believe this a temporary fix at best. Those sharp center punch marks will eventually score the ways, and create bigger problems than what you started with. It would be far better to raise the tailstock with brass shims. Shimstock is available in .0015" and thicker for this purpose. I suggest leaving the stock long, bending the material up on the ends as illustrated *below*, and fastening the brass to the tailstock using ⅛" pop rivets or metal screws.

—Ken Klass, Orchard Park, N.Y.


Shim until headstock and tailstock centers line up.
Brass shim stock underneath tailstock
Bend ends of stock up and screw or pop-rivet to tailstock on both sides.

Let us know what's on your mind

We welcome your comments, criticisms, suggestions, and yes, even compliments. We'll do our level best to publish letters of the greatest benefit to all of our readers. Write to us at: Talking Back, *WOOD* Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379.

Turning scraps into teaching tools

Pete Stephano's article in the January 1997 issue, "Woodworkers to the Rescue," made me want to share a way that almost any woodworker can help others.

Many woodworkers have saved small pieces of hardwood—pieces too big to throw away and too small to ever use. These scraps, along with ¼" dowels, can become indispensable by turning them into alphabet blocks for kids trying to learn Braille.

—Ray Duffee, Boone, Iowa

Ray, we were so intrigued by your idea that we contacted Nancy Lavack, of the Texas School for the Blind and Visually Impaired. Nancy told us that while there is some need in the U.S., other countries need these materials even more. One school in Nigeria has over 400 unsighted children and virtually no teaching tools.

Readers, if you're interested in helping out, write to Nancy and she will send you a Braille chart with the 27 symbols you need to know. Every Braille symbol consists of different combinations of dots placed on a six-point grid. With 27 combinations, your set will help a child learn all the letters and numbers. Making extra blocks for some of the letters, like vowels, will allow the kids to spell simple words. If you want to spend an afternoon making a set, here are some tips that will help.

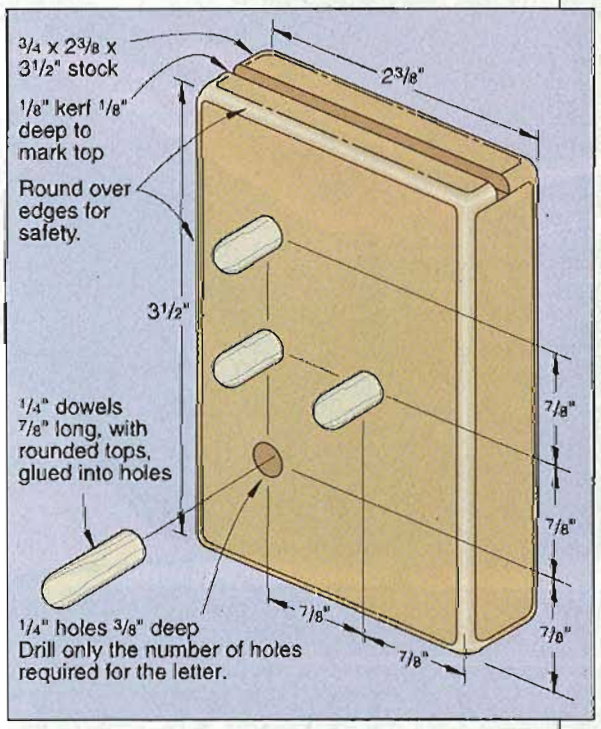
1. Make the blocks: *Cut the scrap into ¾×2⅜×3½" blocks. Each block will require from one to five ¼" dowel pins. Drill the necessary ¼" holes ⅜" deep, using the grid shown in the illustration* right. *Round the edges, and sand each block.*

2. Make the pins: *Cut the ¼" dowels into pieces ⅞" long. Sand the tops to a round shape so they will better simulate the actual Braille type children will eventually read. Then, glue the dowel pins in the holes.*

3. Leave the blocks unfinished: *Blind children must "see" with their fingers, noses, and ears. Leaving the blocks unfinished gives the children an opportunity to feel and smell the differences between wood varieties. Consequently, not only will they be learning to read, they will begin to understand and appreciate wood. So, feel free to use a wide variety of woods in a set. Of course, avoid potentially toxic woods, such as cocobolo.*

4. Mark the blocks: *So the kids will know which end is the top, saw a ⅛" kerf in the top of the block. Also, write the kind of wood and the character represented on the back of each block. This way, even teachers who don't know Braille or wood can help kids learn with your blocks.*

To receive a Braille chart and additional information, write to Braille Blocks Project, Texas School for the Blind and Visually Impaired, 1100 W. 45th St., Austin, Texas. Remember, postage and materials are tax deductible, and you just might help someone learn to love wood as much as you do.



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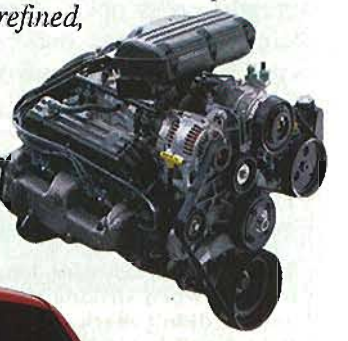


†Always use seat belts. Remember a backseat is the safest place for children. Rearward-facing child seats can be used in the front seat only with the passenger airbag turned off. *J.D. Power and Associates 1995-1997 Automotive Performance, Execution, and Layout Studies.℠ 1997 study based on 29,187 consumer responses.

Woodworking's Greatest Hits

You'll be in the swing with these handy hammers

Drive nails, tacks, and brads with a lightweight nail hammer like this 12-oz. model. Grip the handle near the end for a powerful swing, and lay your thumb along the top for better control.

Woodworkers accustomed to putting pieces together with screws and glue might not think of a hammer as an essential tool. But even if you don't drive 16-penny nails, here are two hammers and a mallet that will earn their keep in your shop.

Nail hammer: the old woodworking standby

While most carpenters rely on a 16- or even 20-oz. nail hammer, a lighter one, say 12 or 13 oz., often serves cabinetmakers and furnituremakers best. One like the 12-oz. claw hammer, shown *left*, fills the bill for general woodworking use.

If you drive a lot of small brads or escutcheon pins, try a Warrington pattern hammer as your nail hammer. Instead of the usual nail-pulling claws, this one has a straight cross peen, shown *right*. The narrow face makes starting small nails easy, as shown.

We like a hardwood handle—particularly hickory or northern ash—for a nail hammer. Wood absorbs shock for more comfortable use, and it's replaceable.

Grab a nail hammer for:

- Driving nails, brads, and tacks.
- Setting nails with a nailset.
- Tapping a centerpunch to mark drill centers on wood.

Don't use it for:

- Striking woodworking chisels, cold chisels, or star drills.
- Driving masonry nails. (A heavier hammer is better.)
- Pounding metal against an anvil.

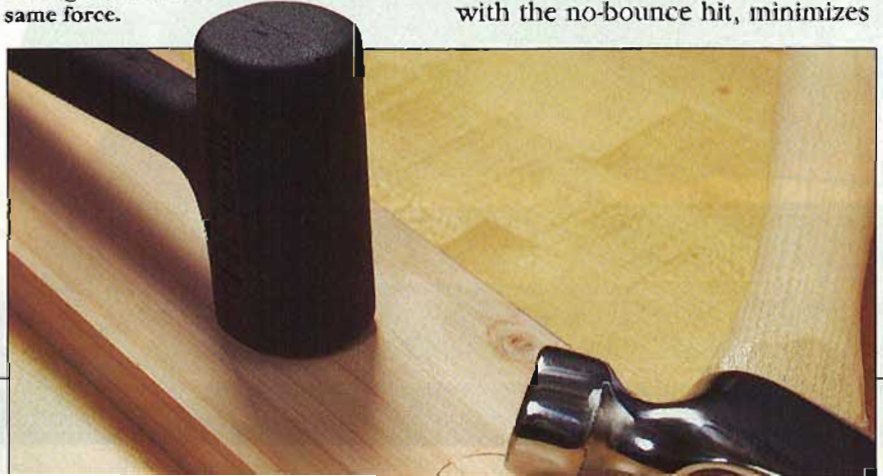
You won't smash your fingers when starting small brads or nails with the straight cross peen on this 6-oz. Warrington pattern hammer. Choke up on the handle for a lighter swing.

Dead-blow hammer: a solid hitter with a gentle touch

The dead-blow hammer's hollow head, filled with steel shot, delivers a solid blow without rebounding. Some dead-blow hammers feature replaceable steel or plastic faces. For woodworking, however, we prefer a 14-oz. urethane-encapsulated type, shown *below*.

The resilient covering, coupled with the no-bounce hit, minimizes surface marring when you use this hammer against wood. There's no better tool for tapping joints together or knocking them apart. You usually won't have to take mighty swings with this hammer, which also prevents damage to project parts.

The dead-blow hammer, left, minimizes marring when striking wood—this 14-ouncer didn't mark the soft cedar. A lighter nail hammer dimpled the surface, right, when swung with the same force.



Use a dead-blow hammer for:

- Assembling/disassembling joints.
- Aligning parts.
- Setting dowels or splines.
- Adjusting/tuning tools.

Don't use it for:

- Striking chisels.
- Driving nails or other fasteners.
- Hitting sharp objects that could damage the covering.

Continued on page 10

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The Mirage® hearing aid is so advanced and compact it fits completely into the ear canal. In fact, the Miracle-Ear® Mirage® is designed to maximize your natural ability to hear sounds.* Yet within this tiny hearing aid we've incorporated some of our latest technology.

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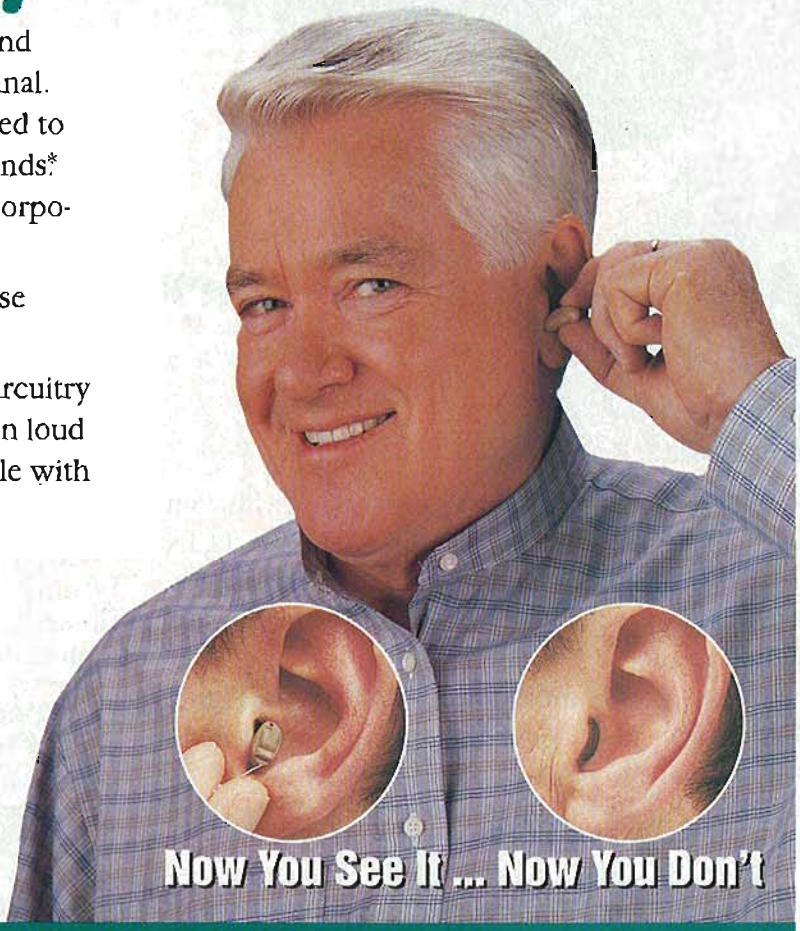

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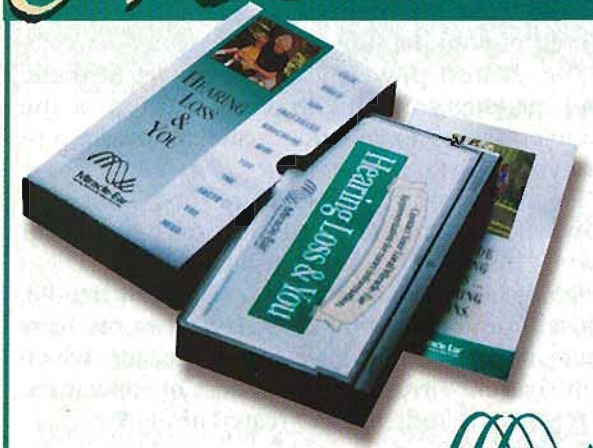

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Now you can saw flush to any surface with your FEIN "Triangle" Sander. The newly named FEIN "Multi-Master" comes equipped as a Detail Sander, but now also includes a Flush cutting blade, and a Scraper blade.

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Continued from page 8

Woodworking's Greatest Hits

Wooden mallet: your best bet for striking a chisel

If you own woodworking chisels, you need a wooden mallet like the one shown *below*. It's the tool best suited to driving chisels.

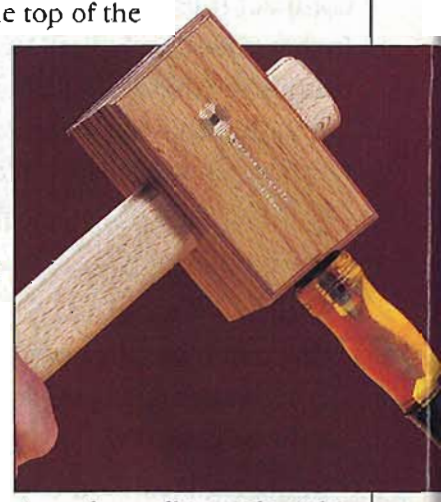
The mallet's large, flat, angled faces ensure that you'll hit the chisel squarely every time. Hitting the end of a chisel with a nail hammer's small face calls for unerring aim and concentration—which means you end up watching the top of the chisel handle when you should be paying attention to the sharp end. (A steel hammer head can clobber up a wooden chisel handle pretty badly, too.)

Count on a wooden mallet for:

- Striking woodworking chisels—the tool's main purpose.
- Assembling or disassembling joints.
- Aligning parts.

Don't use it for:

- Striking anything metal or sharp.



A wooden mallet excels at driving woodworking chisels. The large striking face is angled to hit the chisel squarely.

Check out these commonsense hints for hammering

Hammering is practically instinctive. Nonetheless, observing a few rules will make it safer and easier.

✔Always wear eye protection. Any number of things can start flying around when you're wielding a hammer, many of them sharp. And most of them will fly right toward your eyes.

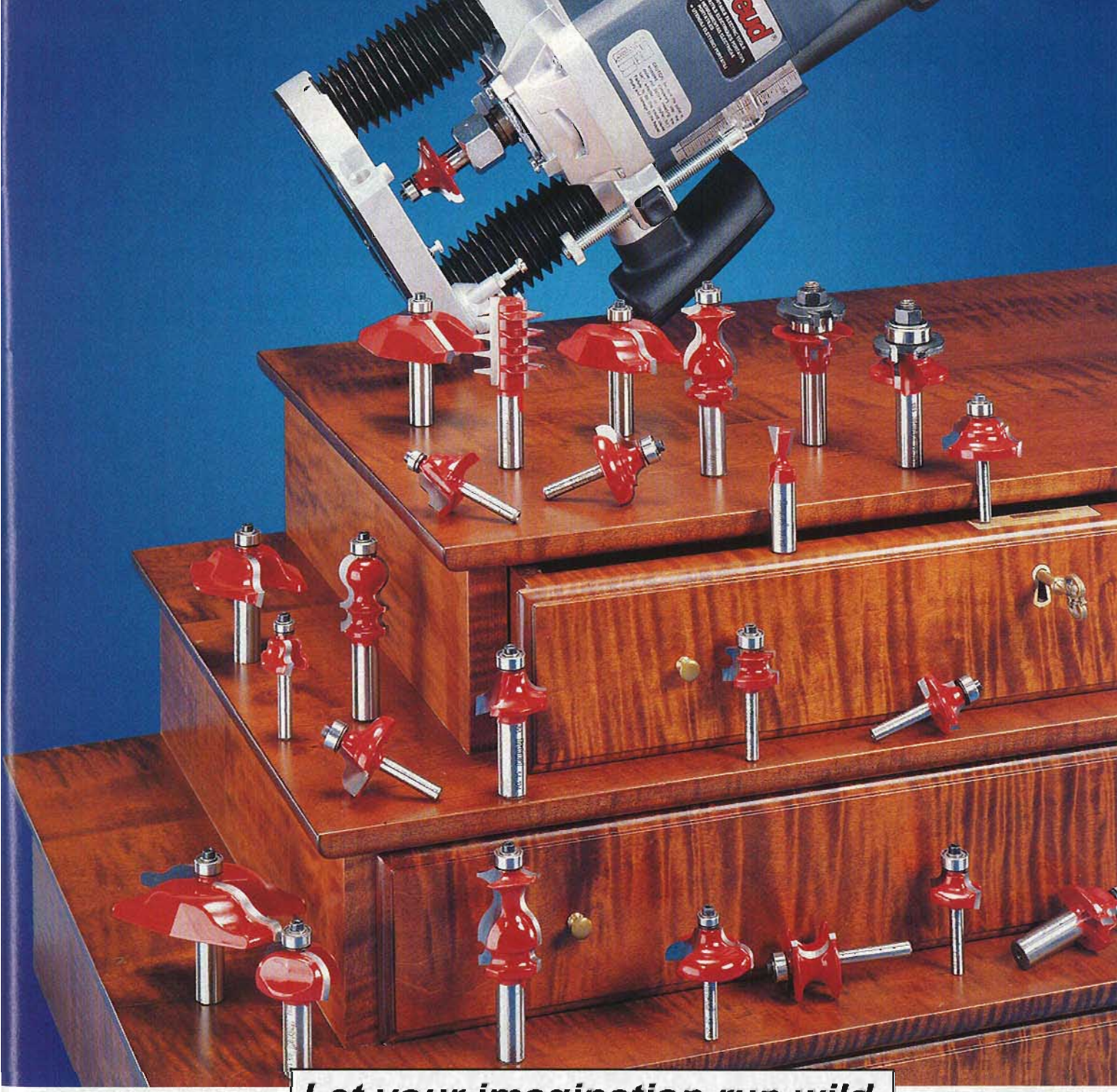
✔Strike only on the face or peen of the hammer. Never hit with the side of one.

✔For greatest power, grip the handle near the end, placing your thumb along the top of the handle. Take a long swing, using your arm, not just your wrist.

✔For more control on delicate jobs, choke up toward the hammerhead, and take a shorter swing. Here you can swing from your wrist.

✔Don't use a hammer with a damaged handle, loose head, or chipped face. Beware of old hammers, too. Some may have cast-iron heads, which can shatter. Virtually all hammers manufactured today feature forged, heat-treated heads.

Photographs: Hetherington Photography



Let your imagination run wild.

Create beautiful edges, from a classic round over to a multi-pass cut, Freud bits can turn your router into a real dream machine.

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Your safety is always most important, so we've made every Freud router bit with a special **anti-kickback design** that really works. It doesn't interfere with the speed or performance of your bit, but it does help keep you safe.

When you need just the right profile to turn your project into a masterpiece, Freud offers the **widest selection of bits** for any woodworking application (Including hard to find architectural and complex moulding profiles). Try one and you'll see why Freud is **precisely what you need.**

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Window Sash Set

We shed some light on how to use these tricky bits

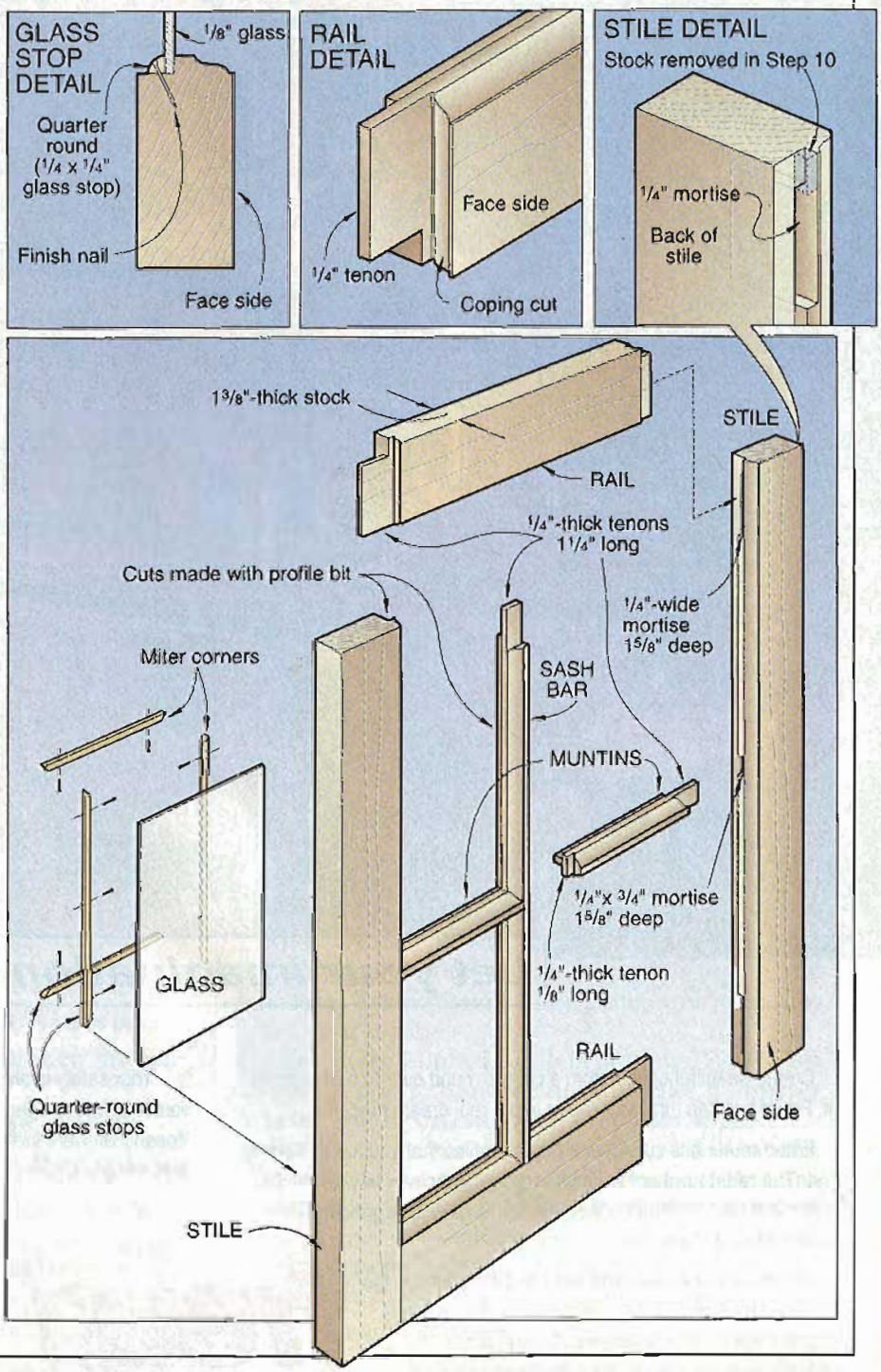
If you've considered making your own custom windows or french doors, but thought the task was a little too involved, here's a bit set that helps you get great results without a lot of fuss. Window sash sets consist of two bits like those *above*. With them you can make traditionally styled rail-and-stile frames with coped joints and a rabbeted side for accepting glass. You can also make the narrow sash bars and muntins for holding multiple panes of glass (our window *right* shows four panes, but your window or door may have many more depending on its size). All of the coped joints are reinforced with tenons for long-lasting durability.

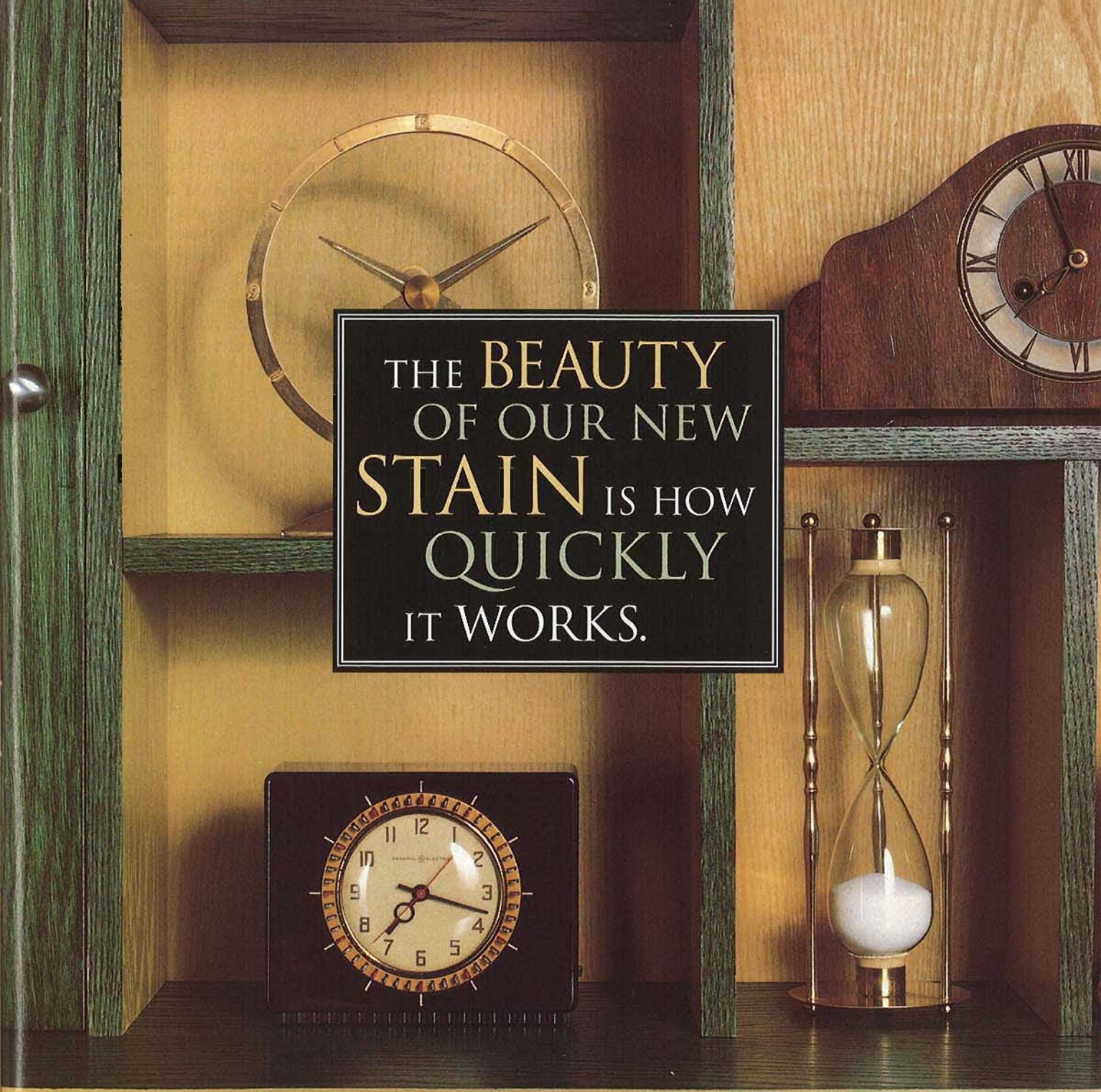
Because you will plow these bits through 1⅜"-thick stock, they come with sturdy ½" shanks. For safety and good results, use them with a router rated at 1½ hp or more mounted in a table. All set? Let's go through the easy steps in using this bit.

1 Cut your stiles, rails, sash bars, and muntins to width and length from 1⅜"-thick stock. Here's how to calculate the lengths of your parts, using an 18×24" window with 3"-wide rails and stiles as an example.

First, cut the stiles to the full height of the window (24"). To figure rail length, subtract the combined width of the stiles (6") from the finished width of the window (18"). To this number (12"), add the length of two tenons (1¼" + 1¼")

Continued on page 14





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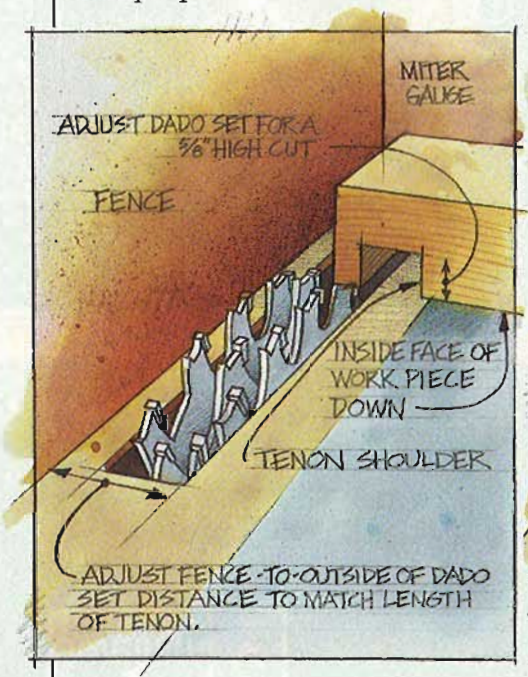
Continued from page 12

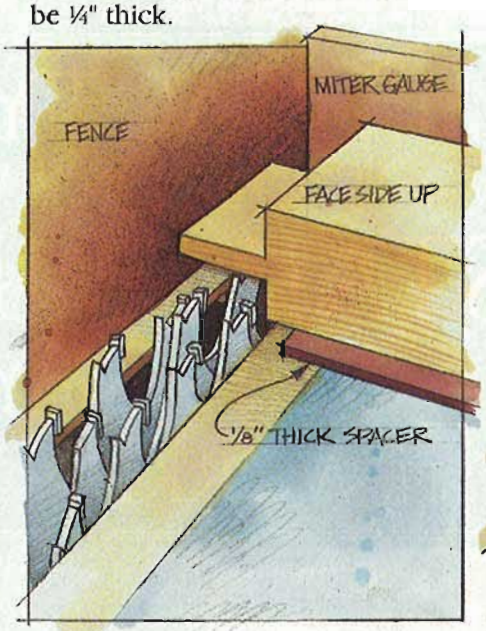
and ½" (for the coped joint). So, for our example we cut the rails 15" long. Cut the sash bars and muntins ¾" wide and calculate their lengths as you did the rails. (Plan to cut 1¼"-long tenons on both ends of the sash bar and muntins; you'll trim the muntin tenons that intersect with the sash bars to ⅛" long later.)

2 Mark the face side of your workpieces (the inside surface of your window or the most-viewed side of your door). Also mark the outside edges of the rails and stiles, and place marks centered on the rails and stiles where they intersect with the muntins and sash bar, and on the sash bar where it intersects with the muntins.

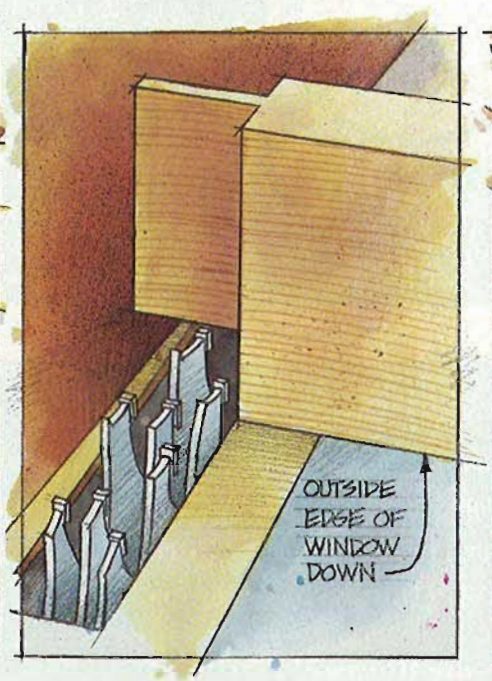
3 To cut 1¼" tenons on both ends of the rails, sash bars, and muntins, install a full-width dado set in your tablesaw and adjust it for a ⅜"-high cut. Position the saw's fence 1¼" from the side of the dado set farthest from the fence. Place the workpiece on the tablesaw face down with one edge against a miter gauge, and one end against the fence. Make the cut in multiple passes as shown *below*.


MITER GAUGE
ADJUST DADO SET FOR A ⅜" HIGH CUT
FENCE
INSIDE FACE OF WORK PIECE DOWN
TENON SHOULDER
ADJUST FENCE-TO-OUTSIDE OF DADO SET DISTANCE TO MATCH LENGTH OF TENON.

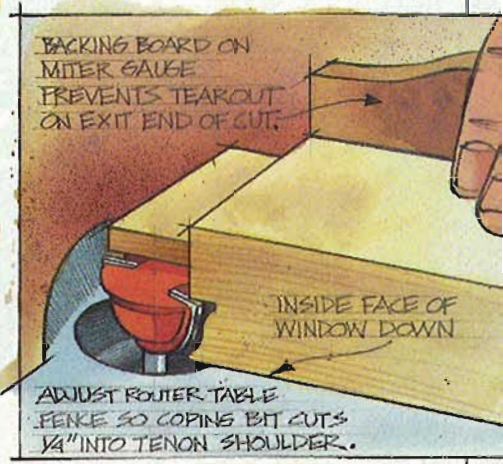
4 Position the rail, sash bar, or muntin face side up on the tablesaw. Place a ⅛" spacer between the workpiece and tablesaw top as shown *below*, and make the same cut as described in the previous step. Your tenons should be ¼" thick.



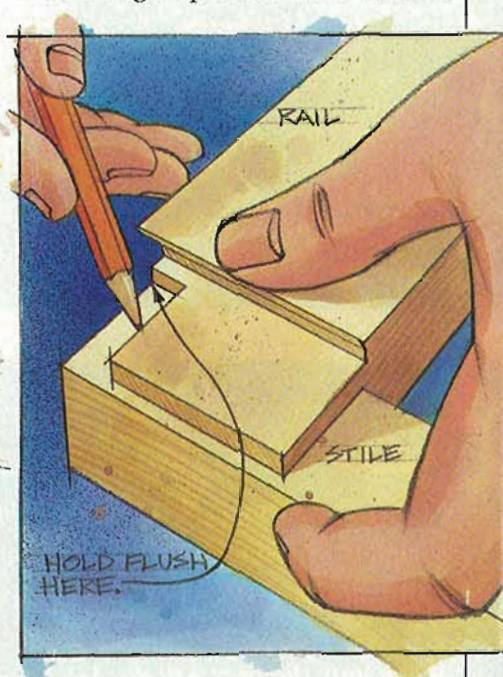
5 Complete the tenon cuts on the rails by placing them outside edge down on the tablesaw. Make multiple cuts with the dado set ⅜" high as before



6 Install the coping bit in your router table. Place the face side of a rail on the table and adjust the coping bit up so the tops of its cutters contact the tenon. With the fence adjusted so the coping bit cuts ¼" past the tenon shoulder, cut both ends of the rails, sash bar, and muntins. (For a 1¼"-long tenon, set the fence 1½" from the cutter tip with the tip rotated to its farthest distance from the fence.)


BACKING BOARD ON MITER GAUGE PREVENTS TEAROUT ON EXIT END OF CUT.
INSIDE FACE OF WINDOW DOWN
ADJUST ROUTER TABLE FENCE SO COPING BIT CUTS ¼" INTO TENON SHOULDER.

7 Mark the positions of the mortises on the stiles by using the tenon that mates with it. First, as shown *below*, stand the stile inside edge up on a work surface



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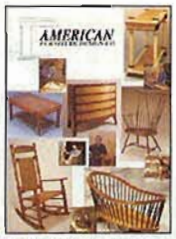

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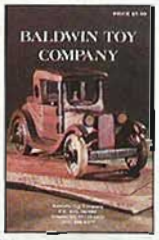

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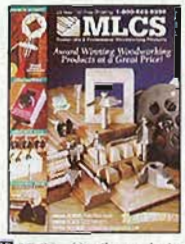

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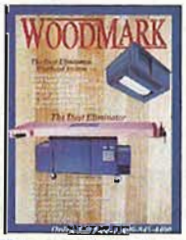

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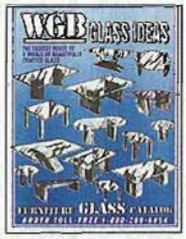

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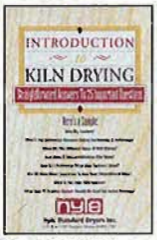

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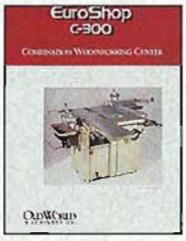

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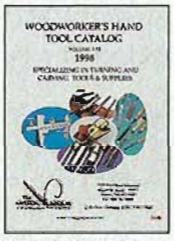

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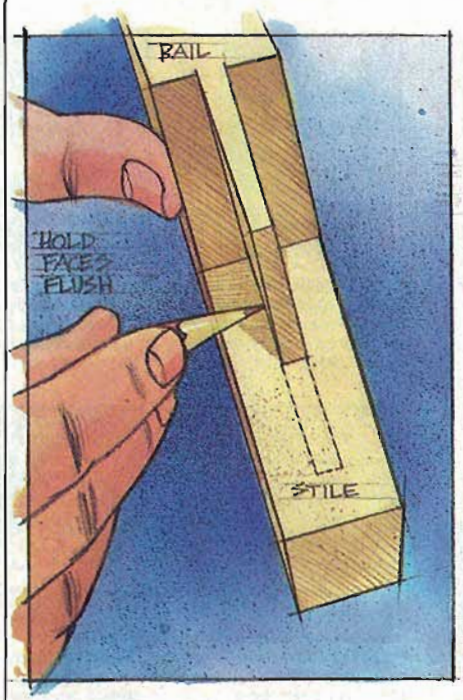
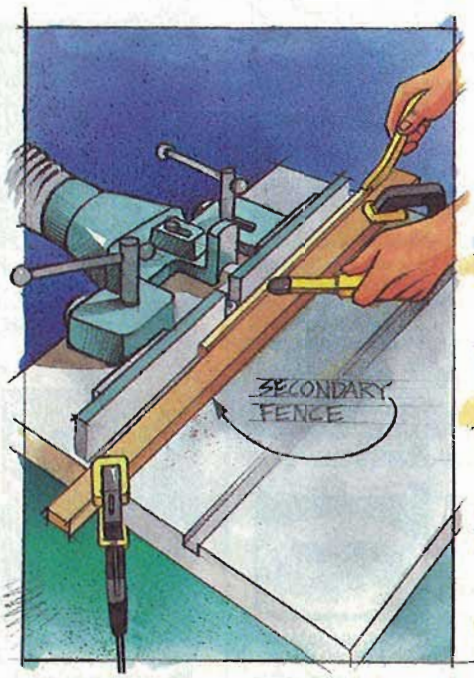
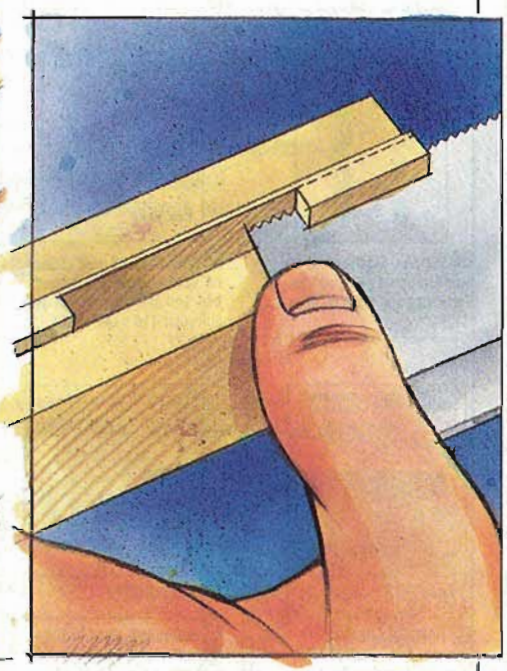






and position the rail to mark the length of the mortise. Then, rest the rail on top of the stile as shown *above* to mark the mortise width. Use the same steps to mark the position of the mortises that hold the sash bar and muntin tenons.

Cut the mortises ⅜" deeper than the length of the tenons. The mortise in the sash bar will go completely through it.

8 Install the profile bit in your router table and adjust it as shown *below*. With the face side down, mold the inside edges of the rails and stiles.

9 To perform the same operation on the sash bar and muntins, clamp a secondary fence onto the router table as shown *above*. Make this fence from 1¼"-thick stock, and position it so the sash bar and muntins slide snugly between it and the main fence.

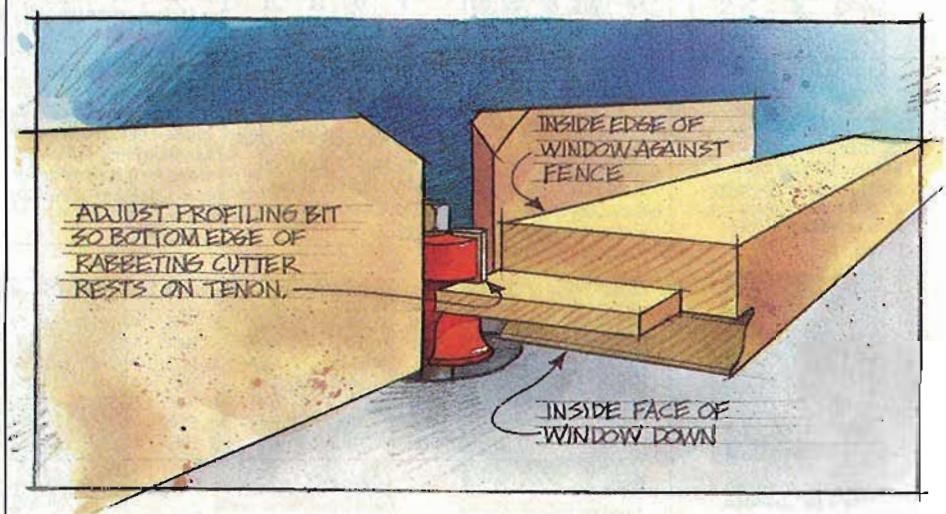
10 Mold both edges of the sash bar and muntins. Use pushsticks to pass the stock between the fences.

Use a fine-toothed saw to remove the small amount of material on the outside end of each stile mortise as shown in the illustration *above* and in the Stile Detail drawing on *page 12*. If you make more than one window or door you may want to set up a router table with a straight bit to do this more quickly.

Now's a good time to trim the muntin tenons that intersect the sash bar. Cut them to ⅛" long.

11 Assemble the project without glue to check for fit and squareness. Disassemble, apply glue to all mating surfaces, and clamp. Check for square again before the glue sets up.

12 Install the glass in the rabbeted openings on the back face of the door or window. Each pane should be ⅛" smaller in width and length than the rabbeted opening it fits into. Mount the glass in place with glazing points and glazing putty, or with quarter-round strips of wood mitered on their ends and nailed down (see the Glass Stop Detail drawing on *page 12*).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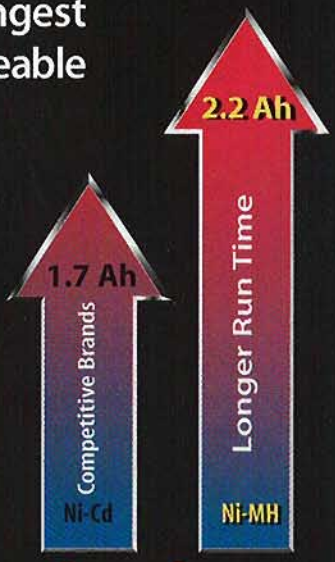

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Top Tip winner Allan Kruger enjoys some time at the scrollsaw.

Most of us can only dream of the life Allan Kruger has made for himself. His 28×30' workshop, nestled into the side of the White Mountains of Arizona, overlooks the high desert. When Allan and his wife Olga aren't making wooden crafts to sell at shows, he likes to make furniture.

Living this way has disadvantages, though. Allan can't harvest material from the woods surrounding his home (most of it is national park land). And because he's miles from "civilization," just running to the hardware store is a major time commitment. So, when he needed a hold-down clamp, Allan found it faster to make his own. And we're glad he did because we've chosen his clamp *right* as this issue's Top Shop Tip.

Like Allan, you've probably come up with your own unique solutions to woodworking problems. If so, your idea may be worth $40. And if we select it as the Top Shop Tip, you'll win a valuable tool prize. To submit a tip, send a letter, including your daytime phone number, and a photo or drawing of your idea, to:

Tips From Your Shop
(And Ours)
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Dave Campbell
GENERAL-INTEREST EDITOR

Hold it! These hold-downs are homemade

As our Top Shop Tip winner, Allan receives a Makita 3621 1¼-hp plunge router. Thanks for the tip, Allan!

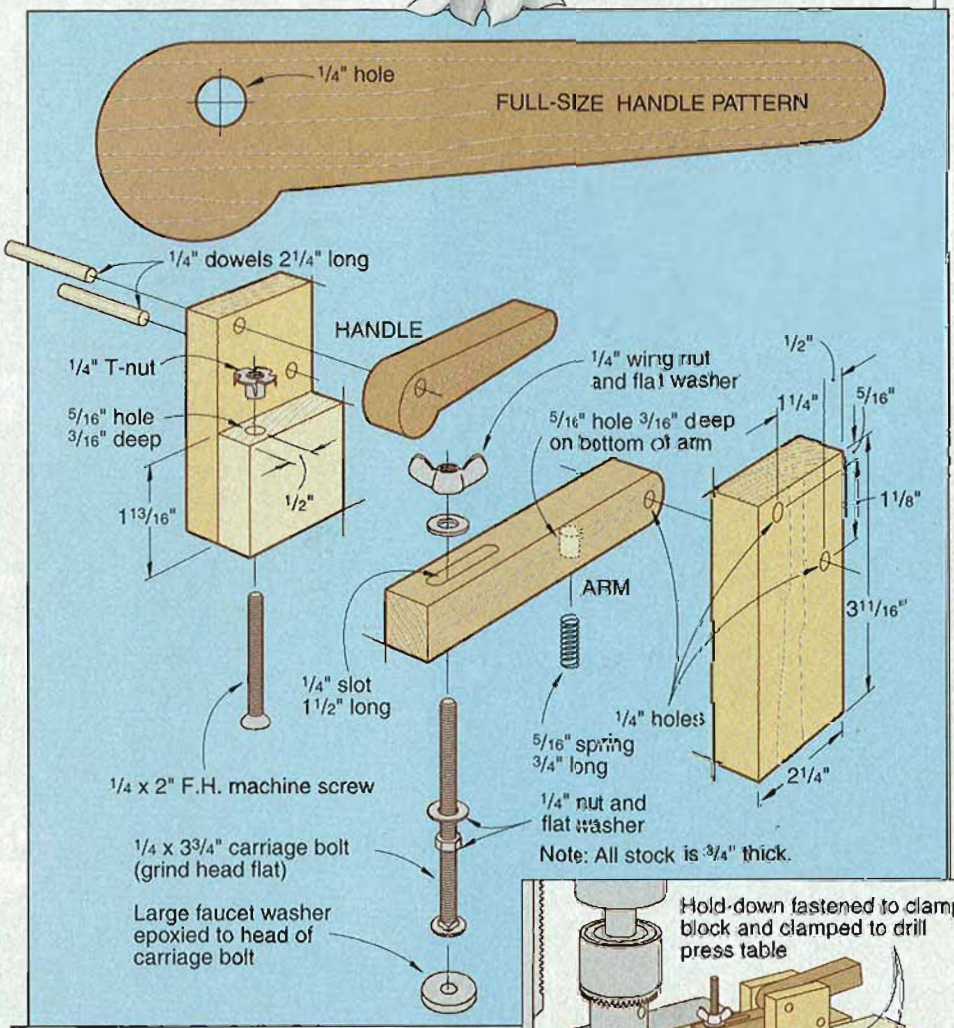
While building a project, I found myself needing a hold-down clamp. Because I live over 200 miles from the nearest home improvement center, I thought I'd try to make my own. The clamp shown *below* works so well, I've made several more since.

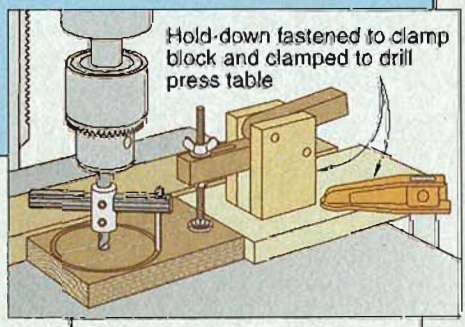
I cut the handle, arm, and base from scraps of hard maple. To make the shoe, I ground the head of a carriage bolt flat and epoxied a faucet washer to the head.

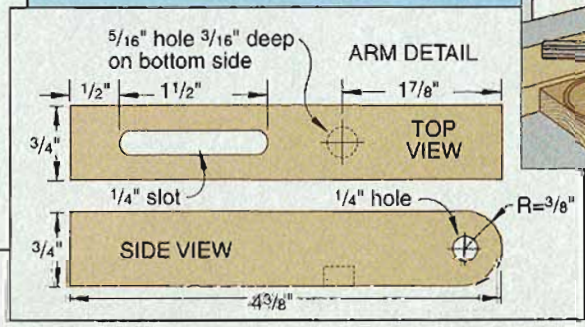
TOP SHOP TIP

The clamp screws to a jig or fence from the bottom, but when that's a problem, I bolt it to a larger plate, then screw the plate to my work surface. You can also accommodate thicker workpieces by making a taller base, or by inserting a spacer to raise the clamp height.

—Allan Kruger, Eagar, Ariz.







Continued on page 22

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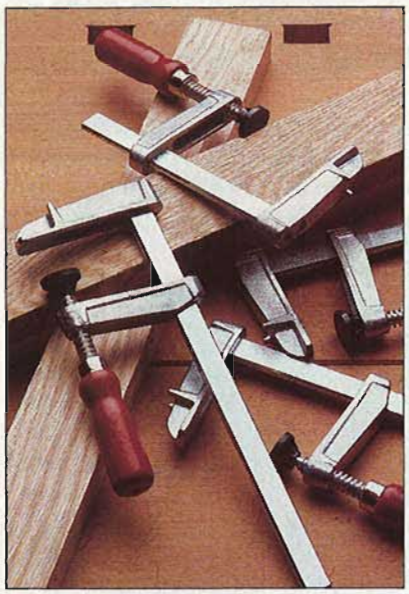

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TIPS FROM YOUR SHOP (AND OURS)

Continued from page 20

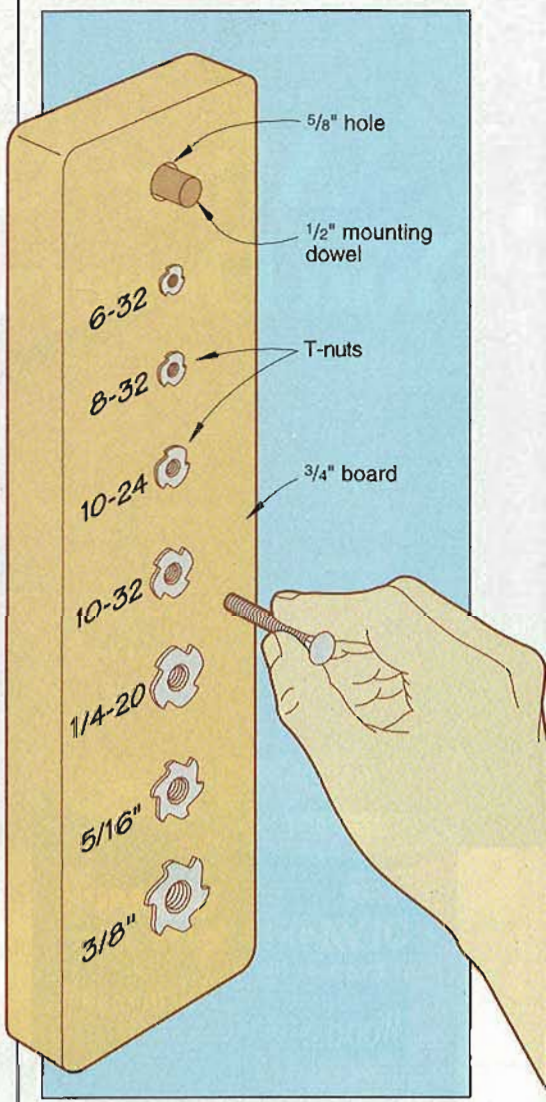
Speedy sorter for mixed nuts (and bolts)

I collect nuts and bolts like a magnet. But I couldn't use them if I couldn't find them, so I needed a way to quickly size and sort them.

In a piece of scrap lumber, I mounted T-nuts of the most common thread sizes, and wrote the size of the nut next to it. I drilled a hole at the top of the sizer, and hung it on the pegboard over my workbench.

Whenever I have bolts left over from a project, I try them in each hole of the sizer until I get a fit, then store them according to size. It works so well, I made another one to sort nuts, by putting bolts through the T-nuts from the back.

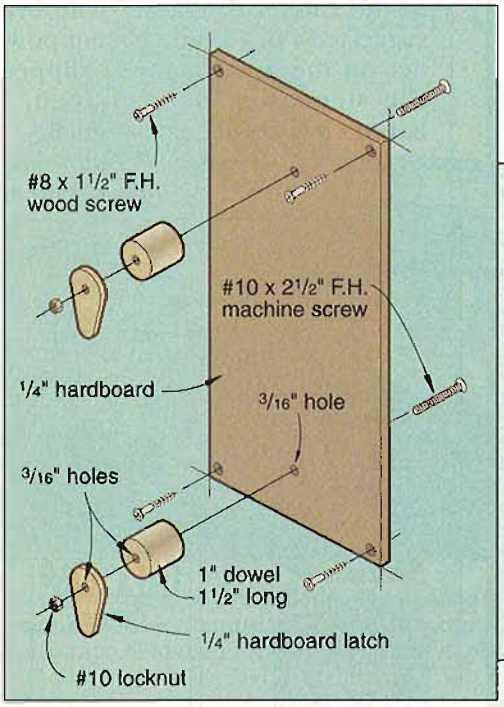
—Jim Jaffe, Hawthorne, NJ.

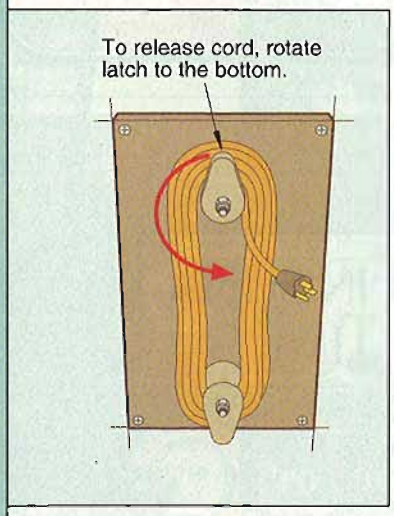


Rack keeps extension cords at the ready

After watching me wrestle with a 50' extension cord to wind it back onto a flimsy plastic holder, my wife suggested a more convenient solution—a wall-mounted rack next to the electrical outlet. The rack I built, shown *below*, leaves both hands free to wrap up the cord. To make the cord easier to remove, I installed "latches" that swivel out of the way.

—Michael Ward, Spring Valley, Ill.



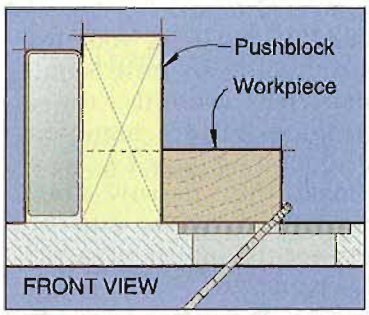


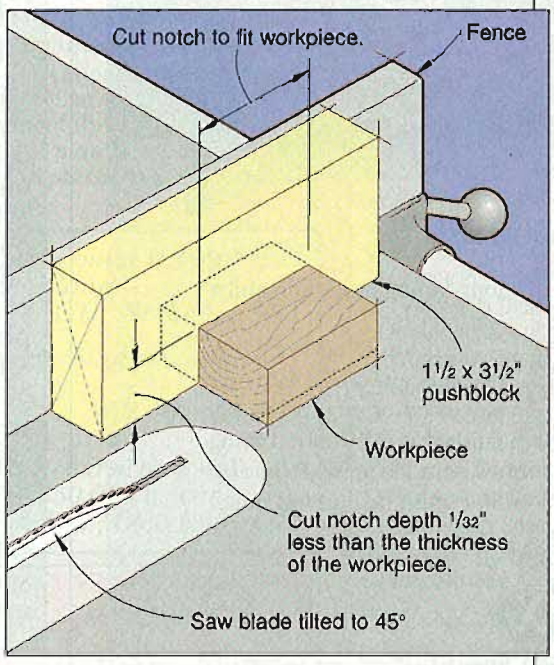
Custom pushblock safer for small pieces

I needed to chamfer the edges of a small block of wood to make a decorative post cap. But when I tried to use my regular pushstick, the tablesaw blade twisted the block away from the fence, gouging the workpiece beyond repair.

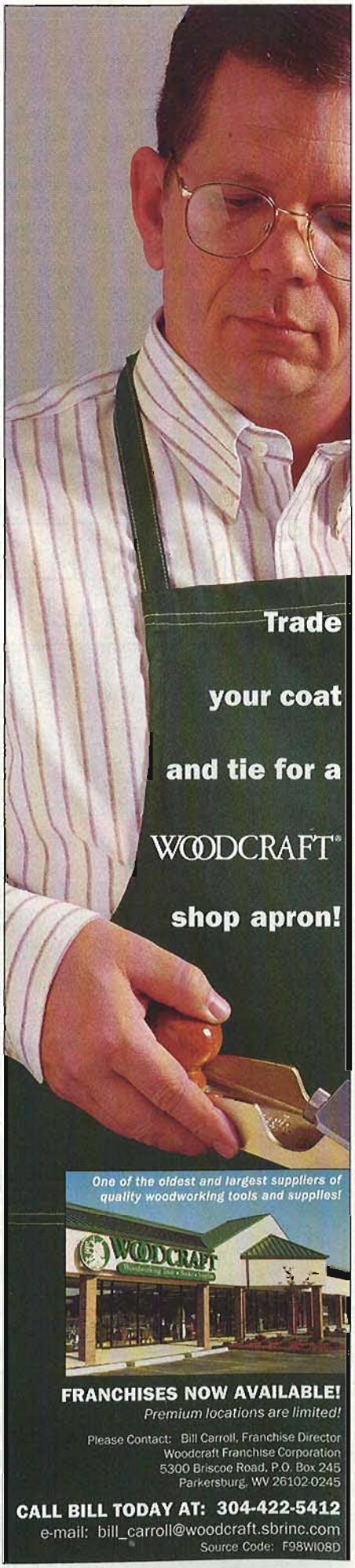
To keep the workpiece under control, I built a custom pushblock from 2×4 scrap, as shown at *right*. By cutting a notch in the scrap to fit the workpiece, the pushblock holds the work firmly when making the cut, and prevents the saw blade from twisting and pulling the stock away from the fence.

—Richard Rosencrans, Cody, Wyo.




Cut notch to fit workpiece.
Fence
1½ x 3½" pushblock
Workpiece
Cut notch depth 1/32" less than the thickness of the workpiece.
Saw blade tilted to 45°

Continued on page 24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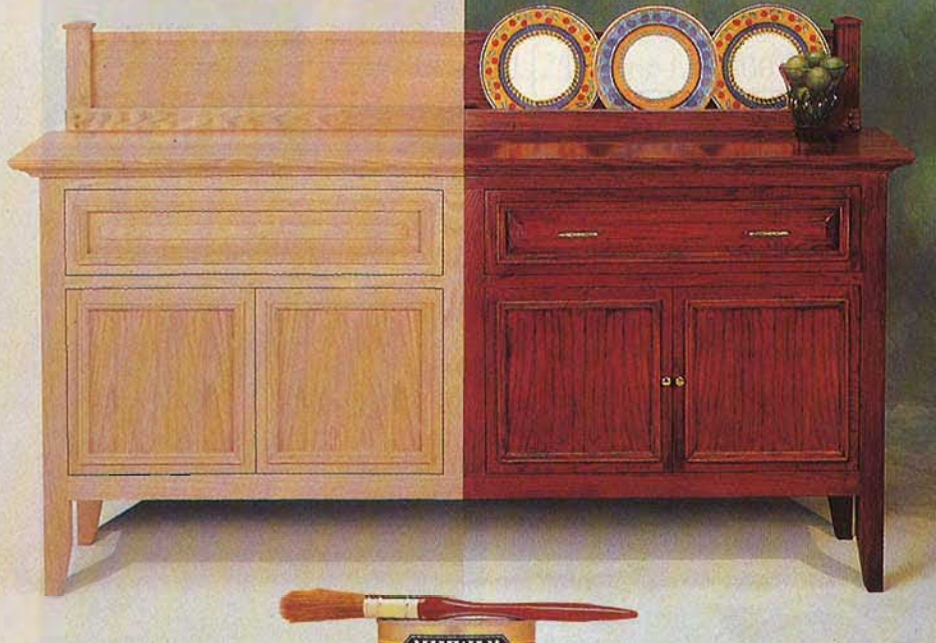

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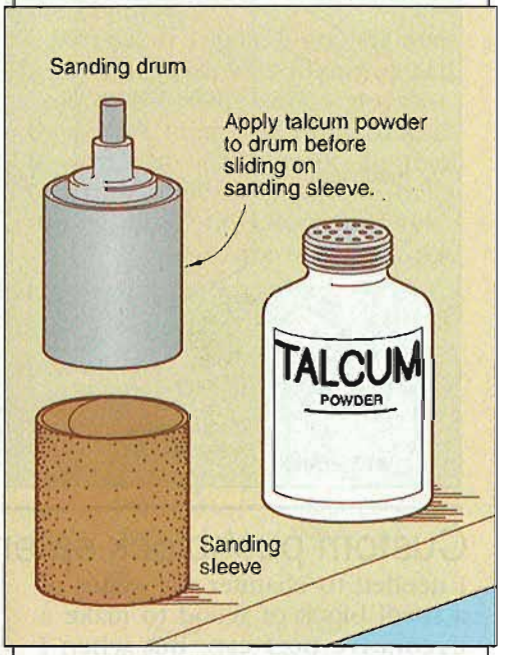
TIPS FROM YOUR SHOP (AND OURS)

Continued from page 23

Powder prevents stuck spindle sleeves

I love my oscillating spindle sander, but when I wanted to change grits, the sanding sleeve invariably stuck to the rubber drum. My wife Lyn suggested I put a little talcum powder on the drum before I slipped the sleeve on. Sure enough, I haven't had a stuck sleeve since.

—Peter (and Lyn) Hurney, Kailua, Hawaii



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- For projects requiring a smooth graceful curve, try using a fairing strip as shown on *page 40*.
- Making louvers is a snap using our jig and process described on *page 74*. The jig allows you to make mating pieces with perfect consistency.
- Instead of smashing your fingers or trying to hold small brads with a comb, try a Warrington pattern hammer. Read about it on *page 14*.
- To make thin, narrow stock safely, read how we cut the springs for the pinball gum ball machine on *page 54*.

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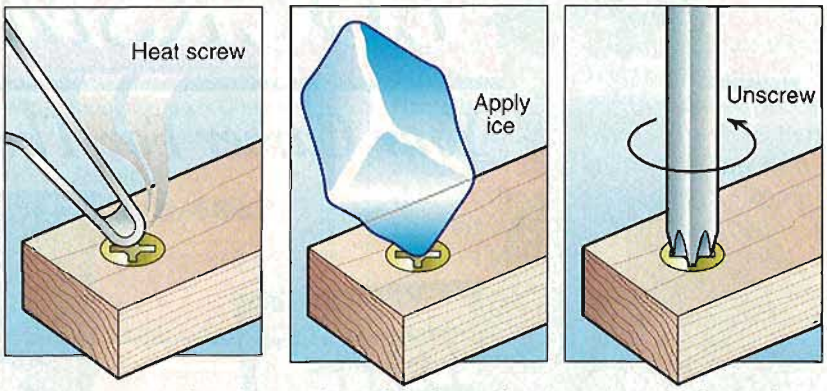
A surefire way to free frozen screws

It never fails: Every time I want to remove a screw from a piece of wood, I strip the head before I get the dang thing to budge. Is there something I can do to help free these frozen screws?

—Jason Bane, Dallas



With time, Jason, wood tends to swell and settle in around the threads of a screw, and 99% of the time, that's exactly what we want. But for those other occasions, try this.

Slowly heat up the screw head with a soldering iron. Be careful, though. Too much heat, too fast, will scorch the wood and finish around the screw. As the screw gets hot it will expand and push the wood away from it. This heat will also break up glue, finish, and other chemicals sticking to the threads. Keep the heat on for a couple of minutes, allowing time for it to work. Then, quickly hold an ice cube on the screw until the ice quits steadily dripping. The metal will shrink, the wood will swell, and the screw should turn right out.

Repairing a mirror image

I've just finished restoring an antique dresser with a round, beveled mirror on it. The wood looks so good now that the flaws in the mirror really stand out. There are places where the silvering has come off the mirror, leaving spots of clear glass. Is there something I can do to fix the mirrored look, or am I going to have to replace the whole thing?

—Robert Boulineau Sr., Wrens, Ga.

Since we're talking about an antique, Bob, replacement should always be the last choice. Other options exist that you should explore first.

If the spots aren't too bad, you can touch them up. There used to be a product on the market for home resilvering, but it has since been pulled from the shelves for environmental and safety reasons. Instead, try applying silver fingernail polish in place of the missing silver. You won't get a perfect match, but the spots will be much less noticeable, for not much money.

If the mirror is beyond touch-up, resilvering is a second option, though there aren't many businesses that provide this pricey service anymore.

As long as the glass itself isn't etched or discolored, you can fix that antique mirror yourself. Start by removing all the old silver. Use paint remover, and carefully scrub it away with steel wool. Then have a thin, flat mirror cut at a glass store to exactly the same size. Mount the new mirror behind the now clear beveled glass, and for half the cost of resilvering, it'll look like new.

Have a question for our woodworking experts?

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Or, visit our internet page and ask your question in one of our discussion groups at: http://woodmagazine.com

Homemade ornamental tools

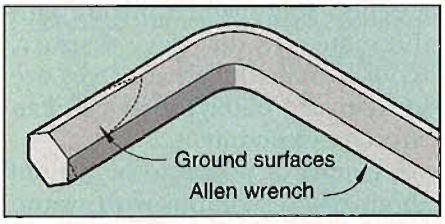
I plan to turn some Christmas tree ornaments on my lathe, and the plans call for them to be hollowed out to reduce the weight of each ornament. What material should I use, and how can I make hollowing-out tools that can fit into small holes?

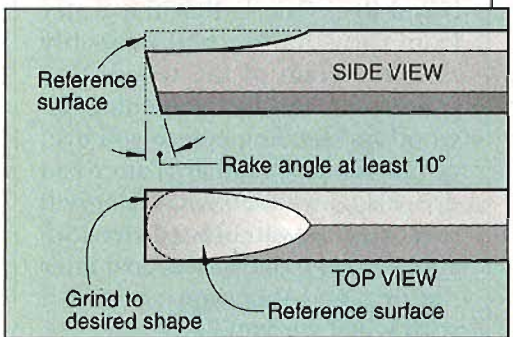
—Rudy F. Hrlevich, West Allis, Wis.

To make your own small turning tools of any kind, Rudy, we suggest starting with Allen wrenches. They're inexpensive, made from good steel, and are readily available in a wide range of sizes.

Start with the largest Allen wrench that fits into your project. This will help dampen vibrations and lead to a smoother cut. Grind a beveled scraper-type end as shown below that forms a profile to meet your needs. Then, grind flat a reference surface for the cutting edge that's two or three wrench diameters long and parallel to the wrench axis as shown below. Now, grind a bevel. This relief is called the rake angle. On inside work of a small-diameter vessel, such as a Christmas tree ornament, you'll need a rake angle greater than 10°.

To help control and hold your new turning tool, grind the bottom flat where it sits on the tool rest, and make a wooden turned handle for it.





Continued on page 28

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HOME CRAFTSMANSHIP

Interest In New Dual Functional Staple+Nail Guns Is Building

A 68-year-old company known for its quality tools has hit the nail on the head with a new staple+nail gun that shoots six different size staples and can drive a 5/8-inch nail as well (far left). Also shown is a new model staple gun that shoots both round crown staples and flat crown staples (far right).

(NAPS)—Interest from homeowners to professional handymen is building in two remarkable new multifunctional tools.

One can shoot six different size staples and drive a 5/8-inch nail as well.

The other shoots flat crown staples for general usage and round crown especially for all the cable and wires that need to be tucked away at home.

The new staple plus nail gun product, from Arrow Fastener Co., is reported to allow a user to accomplish a wide variety of jobs because of its six different size staples: 1/4-inch, 5/16-inch, 3/8-inch, 1/2-inch, 9/16-inch and 17/32-inch ceiling tile. Jobs that can be done range from delicate upholstery work to installing carpeting, carpet padding, ceiling tile and more.

When the staples are removed and a strip of 5/8-inch nails are loaded into the machine, users can trim and decorate door panels, install moldings, fix table edging, or build doll houses and toys for the youngsters.

The Arrow T50®PBN is all steel with high carbon hardened steel working parts to give it added years of dependable performance. The tool is quickly identified by its high visibility cushioned non-slip grip.

The company has also released a new Dual Purpose staple gun called the T2025™. The new model shoots both *round* crown staples and *flat* crown staples. Round crown staples are used to install wire and cable, while the familiar flat crown staples are used for every routine stapling job from putting down carpet padding to installing installation.

Arrow Fastener, a 68-year-old American company, manufacturers a variety of products, for professionals, handymen and hobbyists, that are sold throughout the world in hardware stores, lumberyards and home centers.

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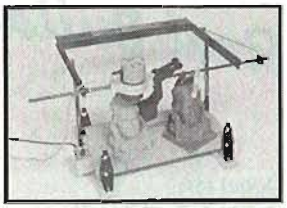
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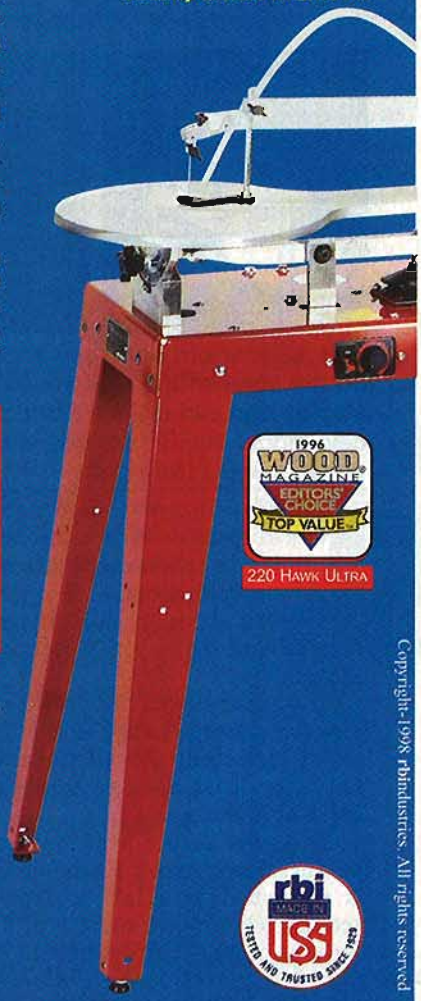
Andy & Joan Lucas

Andy Lucas
Country Sisters in Erie, PA



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H106

ASK WOOD

Continued from page 27

A dye-hard finish

I'm thinking of trying aniline dyes, but am not sure which type to try. I am wondering when it is best to use the kind that is mixed with water, and when to use those that are mixed with alcohol.

—Mark Nelson, via internet

Aniline dyes come in a powdered form, and in a wide variety of colors.

There are some definite advantages to using aniline dyes as an attractive alternative to premixed pigmented stains. Pigmented stains coat the wood. Aniline dyes completely dissolve and soak into the wood. The color is "in" the wood, not on it, and you'll see the grain like never before! With six or seven basic colors available, you can mix about any tone you like.

Most anilines are water soluble because of their ease in mixing. But, different bases will give a different color. For instance, alcohol-soluble anilines give colder, greenish tones when mixed with the same dye that gave warmer, reddish tones in water. Dyes are inexpensive enough that you can afford to experiment.

A couple of points to be careful about when working with water-based dye. One is that the water from the solution will probably raise the grain of the wood. You can remedy this by dampening the wood and sanding before you dye, or fine sanding (220 grit) after you dye. Also, a water-based sealer will react to the water-based dye. So, apply an oil-based sealer coat after the dye, and then you can finish with whatever you like.

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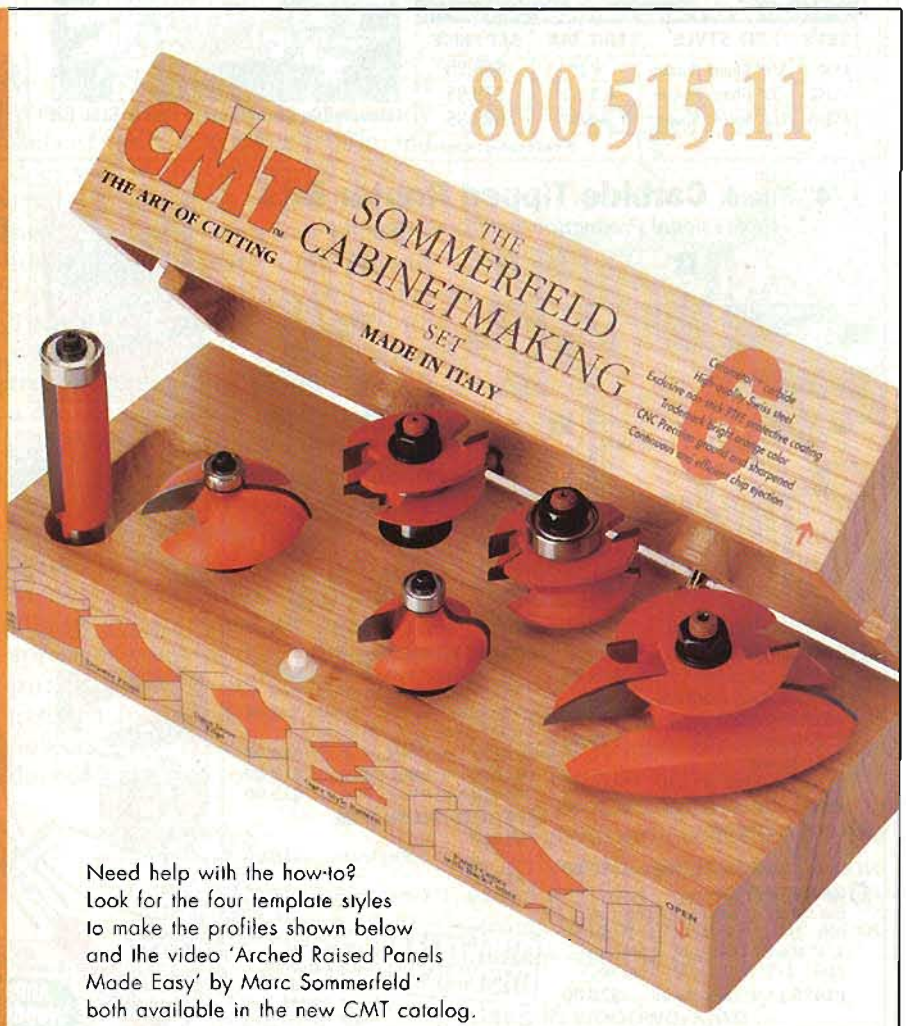
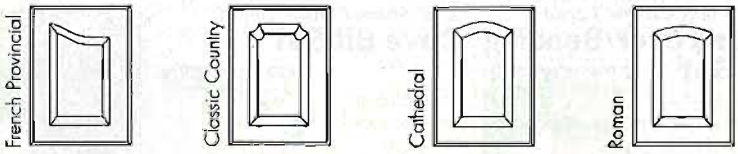


Need help with the how-to?
Look for the four template styles to make the profiles shown below and the video 'Arched Raised Panels Made Easy' by Marc Sommerfeld · both available in the new CMT catalog.



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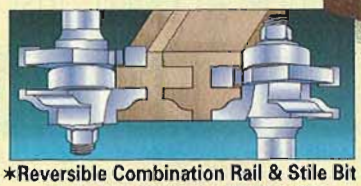
*Ball bearing included

*Raised Panel Router Bit



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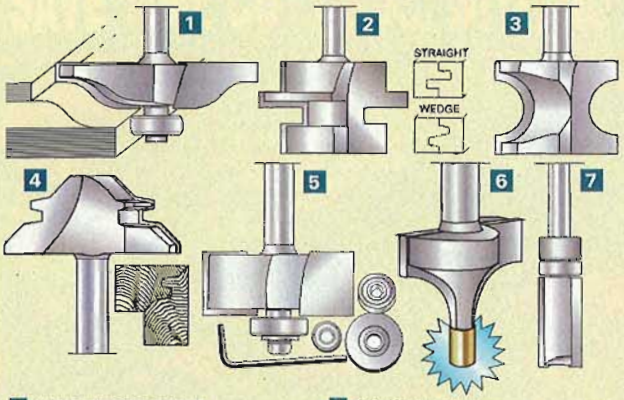

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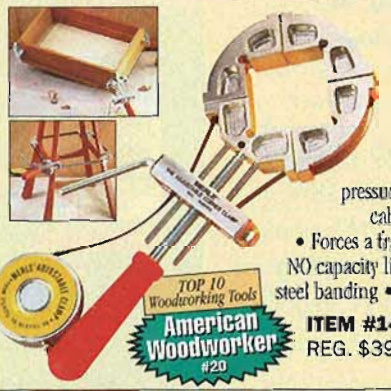

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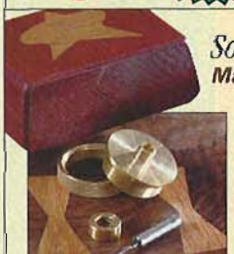

Easy to use inlay kit follows a 1/4" thick pattern template of almost any shape to produce the recess. Fits Porter Cable*, Black & Decker* or any router with an adaptor for Porter Cable bushings. Kit includes 1/8" solid carbide downcut spiral bit, brass bushing, brass template guide, brass retainer nut & instructions.

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RED PINE

The lake states' lumber tree

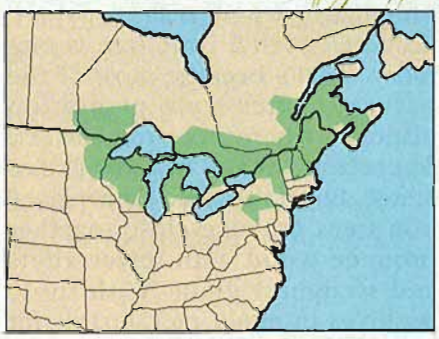
Anyone who has spent time hiking the northern shores of Lake Superior and Lake Huron or in Michigan's Upper Peninsula finds memorable the vast stands of pine. Much of the spectacular scene, though, results from extensive plantation plantings by forest products companies, state forestry departments, and the U.S. Forest Service. And, while Mother Nature traditionally mixes white pine with red, spruce with fir, and adds dashes of birch, ash, and aspen, men planting forests for future timber production feel no such compulsion. That's why after the turn of the century's great log harvests, foresters replenished much of the felled forests with seedlings of red pine, a hard-wooded conifer trusted to grow quickly and straight.

That's the reason the standing volume of sawtimber today in the Great Lakes states consists of great quantities of red pine. In Wisconsin, nearly 34 million board feet of red pine saw logs were harvested in 1995, a figure greater than that for any other of the state's timber species. The wood meets the needs for strong dimensional stock in construction and for flooring, door and window frames, and other millwork. Red pine logs are also popular for rustic homes and cabins.

Wood identification

Commonly called Norway pine because of an early mistaken association with a similar-looking species found in that country, red pine (*Pinus resinosa*) is truly a tree of the North. Its primary range extends from eastern Canada to northern-most Minnesota and south to Pennsylvania and southwest Wisconsin. It thrives in the sandy soils of the Great Lakes region and does well in the dry gravels of New England. In prime conditions, red pine annually grows a foot in height for its first 60 years, then growth tapers off to maturity at 100 years. The tree can attain a height of 140' with a diameter of 4'. The average tree, however, runs 60-80' tall with a diameter of 2-3' at breast height.

The most recognizable feature of the red pine is its reddish brown bark divided into flat, irregularly shaped, flaky scales. This thick bark protects the tree from fire and insects. Red pine's dark green, glossy needles of 4-6" in length appear in pairs. In the spring, small purple blooms occur near new growth followed by round, red flowers. Conical seed cones are produced every two to four years, and remain high in the tree's crown. Where the tree is grown for timber, the hard-to-gather seed cones fetch a good price.



Natural range

Although red pine's Latin name implies large amounts of resin, its wood is comparatively non-resinous. At 33 pounds per cubic foot air-dry, it's a bit heavier than either Douglas fir or eastern white pine. Bordered by a thick layer of light yellow sapwood, the light red heartwood is both straight- and close-grained, and moderately strong. When seasoned, the wood remains stable in use.

Uses in woodworking

Use red pine for the same projects as eastern white pine, with which it was once marketed. That means furniture and cabinets as well as doors, sash, shutters, and trim. Don't use outdoors unless treated.

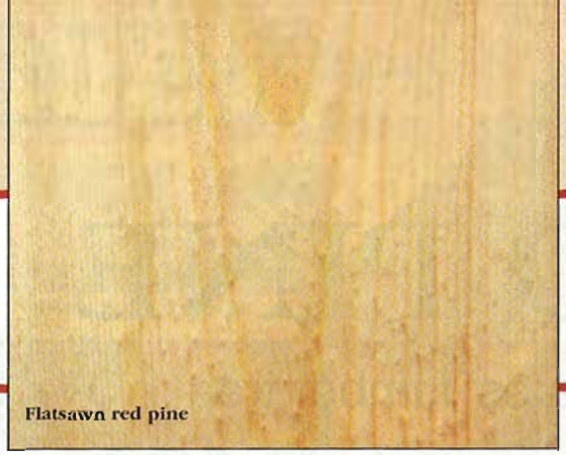
Availability

As dimension lumber and boards, you'll find red pine at most outlets throughout its range. Boards in common grades (Nos. 1, 2, etc.) cost about $1.25 per foot. Wide boards (over 12") and clearer finish grades (C, C&Btr.) cost more.

Continued

PERFORMANCE
PROFILE

red pine
(Pinus resinosa)


Flatsawn red pine

Although red pine will grow to 4' diameter, such a large tree is rare today. That's because most of the harvest comes from plantation plantings where trees run smaller. Therefore, wide boards prove scarce. But at the same time, plantation trees growing close together produce wood with fewer knots and straighter grain. With those positives in mind, pick boards for your project that contain the smallest amount of light-colored sapwood (unless you like contrast).

You'll be lucky if you run across red pine that's been kiln-dried to 6 percent moisture content. In the construction industry, where most of this wood goes, 12 percent is considered dry. Look for the stamp "KD15" or "MC12" on boards that indicates a moisture content averaging 15 or 12 percent.

Be sure to stack and sticker the wood in your shop for a week or two so it can acclimate before working it. Then, keep the following tips in mind.

Machining methods

- Red pine may be strong and stiff, but as a softwood, it's not hard. So you can work it with either hand or power tools.
- If you have worked white pine, expect more pitch in red. This means that to avoid burning and blade wander caused by pitch buildup during ripping or routing, you'll have to occasionally clean cutting edges with acetone or other solvent. A Teflon-coated blade or cutter also works well.
- This wood will also chip and splinter on cross-grain cuts—always use a backing board.
- Because of the pitch, drilling can also cause burning. Drill this wood at a faster speed than hardwood, but be sure to back the bit out of the hole every so often.
- Only sap pockets in a joint will hinder adhesives. If you can't avoid it, wipe the pocket or knot with acetone before gluing.
- Seal all knotholes or sap pockets with shellac before painting.
- To reduce chances of blotchy staining, first seal the wood with a washcoat of thinned shellac, use wood conditioner, or rely on gel stains for even coloring.
- Under a clear finish, red pine will darken and yellow with age.

Carving comments

- Red pine has departures in softness between early wood and late wood, making detail work difficult.
- Remember to clean gum buildup from power tool cutters.
- Limit long cuts with the grain due to this wood's tendency to splinter.

Turning tips

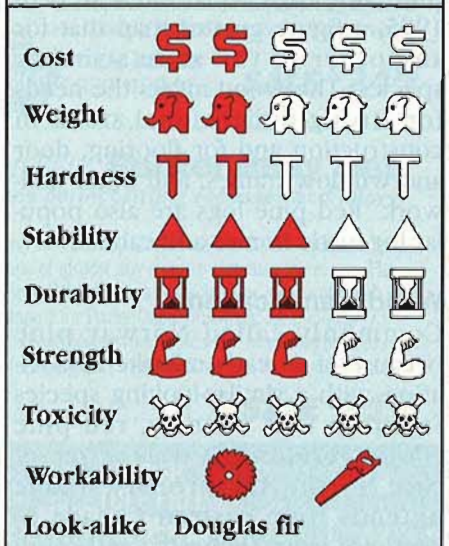
- Should resin droplets emerge on your work, let them dry, then scrape off before finishing.

SHOP-TESTED TECHNIQUES THAT ALWAYS WORK

Any exceptions, and special tips pertaining to this issue's featured wood species, appear elsewhere on this page.

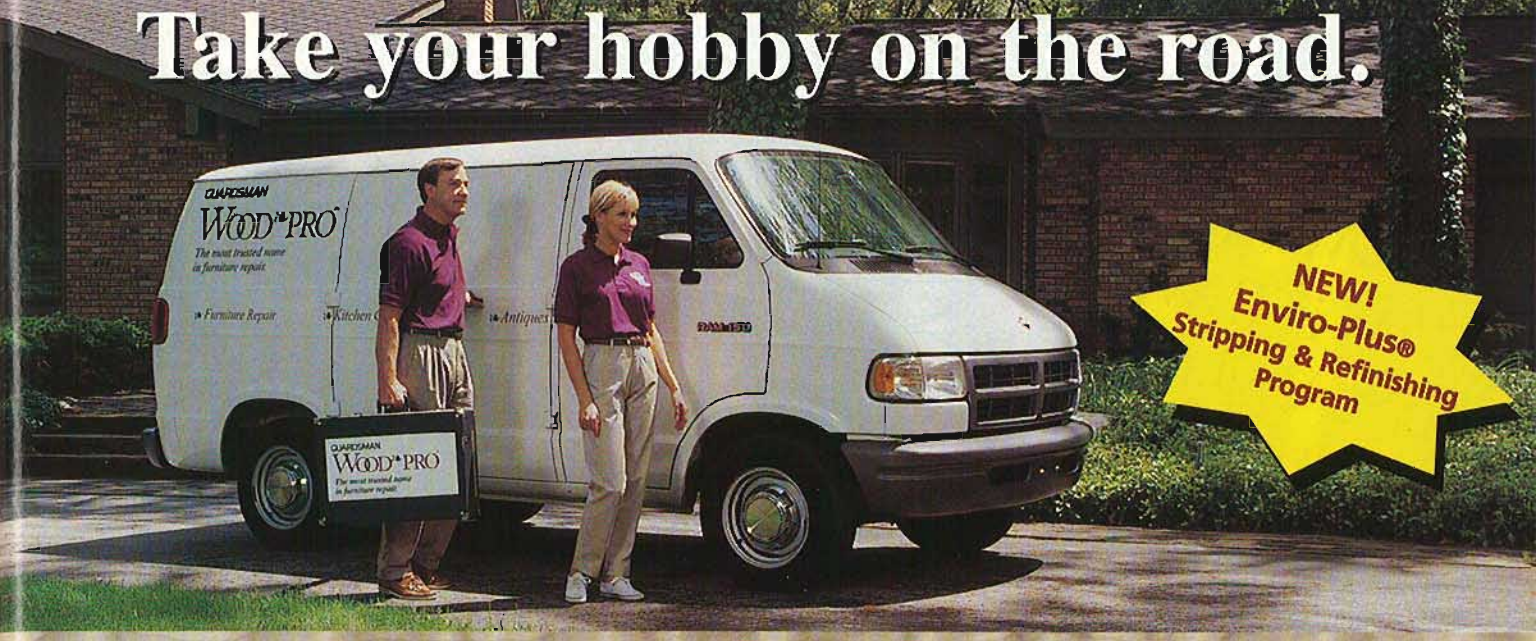
- For stability in indoor projects, always try to work wood with a maximum moisture content of 8 percent. A 12 percent moisture content suits those projects built for the outdoors.
- Feed straight-grained wood into planer knives at a 90° angle. To avoid tearing, feed figured wood or that with twisted grain at a slight angle of 15°, and take shallow cuts of about 1/32".
- For clean cuts, rip with a rip-profile blade that has 24-32 teeth. For crosscutting, use a blade with about 40 teeth.
- Avoid drilling with twist drills. They tend to wander and cause breakout. Brad-point bits work better. Always use a backing board under the workpiece.
- Drill pilot holes for screws.
- Rout with sharp, preferably carbide-tipped, bits and take shallow passes to avoid burning.
- Carving softwoods generally means fairly steep gouge bevels—20° or more—and deeper cuts.

RED PINE AT A GLANCE



Compiled with woodworker David Lewis Illustrations: Steve Schindler

Take your hobby on the road.



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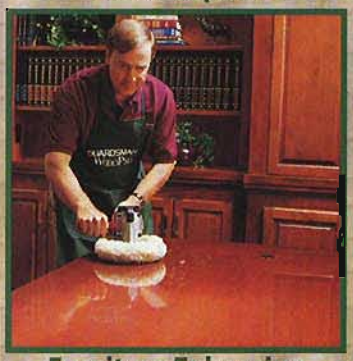
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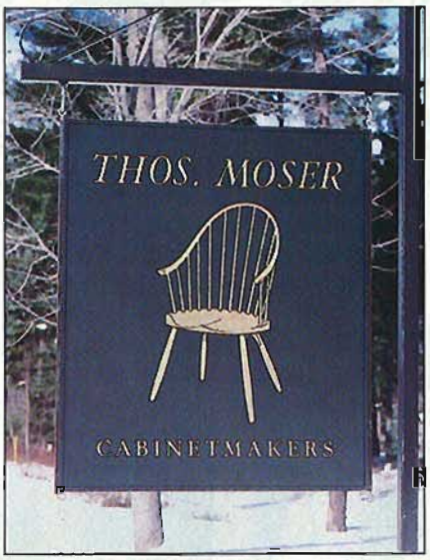
Shaker's Maine Man

Thomas Moser has rekindled America's appreciation of Shaker style.

Continued

If it weren't for Thomas Moser, the furniture designs of the Shakers would probably still be residing mostly in museums. True, a few discerning craftsmen did and still do reproductions. But for the past 25 years, more of the straightforward chairs, desks, stools, tables, and other furniture reminiscent of 1800s Shaker style have made their way into homes from Moser's shop than from any other.

In 1998, though, the term "shop" is a misnomer. Rather, it's a 60,000-square-foot facility neatly nestled on the outskirts of Auburn, Maine. Yet, the gilt-lettered sign outside reads "Thos. Moser Cabinetmakers" rather than "Moser Manufacturing." And that alludes to the secret of Thomas Moser's successful rise from a lone woodworker building pieces one at a time to head of a furnituremaking business that continually satisfies the demands of customers numbering in the thousands.



Moser's philosophy: sales allow creation

Thomas Moser was born in 1935 in suburban Chicago. His father was a stereotyper who laid out printing plates for newspaper presses. Tom, though, became a college professor at Bates College in Lewiston, Maine.

"After 10 years of that, I was feeling a sense of incompleteness. I had always enjoyed making things," Tom says, the twinkle in his brown eyes indicating that he still does. "My wife, Mary, and I for years restored old houses and antique furniture. That's how I got interested in woodworking. I learned by taking apart antique furniture—so my tutors were 18th- and 19th-century craftsmen. I had to teach myself their skills. Because of them, my work has always had a historical side."

When Tom finally started a woodworking business, it admittedly wasn't much. "Mary and I began it in an old Grange hall in New Gloucester, Maine, in 1973. I had a 10" Sears tablesaw, a Skil belt sander with a 4"-wide belt, a 24" bandsaw, and some hand tools. That was it."

"When I started in woodworking, I had no ambition to build a big company. I only wanted to rediscover the craft."

Today, Tom is still learning. And it just may be the learning that keeps up his enthusiasm for the business. However, he'll give you other reasons.

"I believe there are four reasons we're in business. One is that we like to spend our days here. Almost half a person's waking life is spent working, so it better be enjoyable," Tom says reflectively, then continues. "The second is the furniture and the quality that we build into it. What we're making should last for generations. The third is efficiency. How do you make stuff? Are there ways to build it more efficiently? And the last reason we're in business is to make a profit. That's a by-product. I sell furniture in order to make it. I don't make it in order to sell it."

Little boards from big boards: factory efficiency

"When I started in woodworking, I had no ambition to build a big company," Tom explains as he inspects a batch of chairs destined for a university library. "I only wanted to rediscover the craft. I made furniture and Mary sold it. Then I hired a helper. Pretty soon there were four. Next, we grew to six. Why did we grow? Because the possibilities were there."

The growth of Tom's furniture-making wasn't without detractors, he points out. "The minute you grow you're going to lose quality. The second you start dividing labor you'll get mediocrity.' But I proved that none of those things are true."

Despite its size—Thos. Moser Cabinetmakers now numbers 58 in production and another 25 or so in administration—quality indeed gets attention. It's evident everywhere, but begins with the wood.

"Our furniture cherry comes from the Allegheny Mountains in Pennsylvania, where the best cherry grows," comments Tom. "We specify 100% red on one face, 95% red on the second face. That means very little sapwood. We don't want sap streams running through the furniture. That specification alone triples the cost."

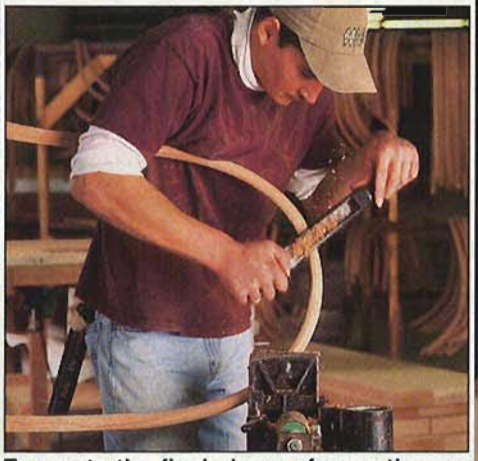
The company also inventories white ash for chair spindles, stool legs, and other round pieces, and walnut and maple for custom work. The stock runs from 16/4 (4") to 4/4 (1") in thickness.

"This is where the business is made or broken," says Tom with a sweep of his arm around the wood-storage room. "If the wood selection isn't proper from the very git-go, the furniture is going to be mediocre. When wood is pulled for a project, it is laid out, color matched, and grain matched. If a guy lost interest for three

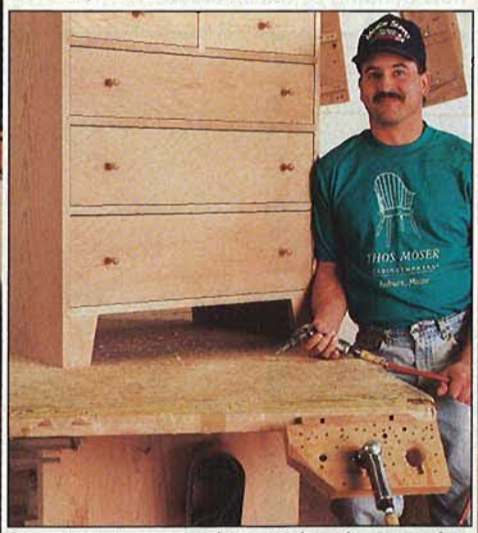
Continued

Photo left: Today, Tom's major role in the furniture company is to design pieces to add to the line. Here he works on a clock prototype with associate Rick Foss to get out the wrinkles for production.

Each continuous arm for a chair is built up of 10 1/10"-thick pieces of cherry. Larry Mosqueda frees the arm lamination from one of the machines that bent it to shape under 20,000 pounds of hydraulic pressure.



To create the final shape of a continuous arm, Eric Simons first routs the edges. Then, over the course of an hour, he works the wood by hand with a rasp.

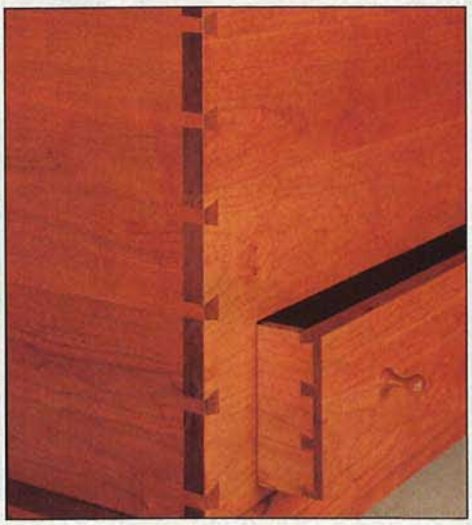


Glen Dehetre, one of the 58 hands-on craftsmen at Thos. Moser Cabinetmakers, takes pride in the small cherry chest he's just completed. He and the other cabinetmakers use pneumatic tools for accuracy.

Photo right: The division of labor is evident at the Moser facility. This area, marked by wood parquet floors, is where the cabinetmakers assemble furniture. The parts production area sits on concrete.

Cindy Morin rubs boiled linseed oil into the post of a bed. When the coats of applied oil have dried, she'll rub on a coat of paste wax, then buff the entire piece.

Final sanding on Moser furniture is done with 400-grit. The platform on which the chair stands adjusts up and down to eliminate bending by the employee.



The dovetail joints on this cherry blanket box are representative of the detailed, fine joinery in Thos. Moser furniture.

hours he could destroy $2,000 or $3,000 worth of lumber."

In what Tom calls the parts department, workers make little boards out of bigger ones. "We get our efficiencies here," he says. "This is almost like a factory. But the concept is serial production, not mass production. We replicate parts to capture efficiencies in set-up time. Set up once, make parts for 40 or 60 or whatever. We don't make furniture from lumber. We make furniture from components.

"We have enough parts on hand to build certain amounts of what we produce," he adds. "The worst thing is to not have one part and make it by hand. There goes the profit right out the door!"

Consistency adds quality to the product

The Continuous Arm Chair is the benchmark of Thos. Moser. It has changed little in over 20 years. One secret to the enduring popularity of this signature piece is the flowing, curved back.

Most furniture factories would turn the wood on a lathe, then steam-bend it to shape. At Thos. Moser Cabinetmakers it's made from 1/10"-thick cherry laminations, then bent to shape by machine. It looks one-piece.

Tom explains: "We knife-cut the cherry, then lay it up as it came from the board. When the pieces are glued back together with aliphatic resin glue, then hydraulically pressed at 20,000 pounds pressure, no one will ever know that the wood was ever apart."

While the rough, laminated chair-arm blank is in the press, a radio frequency modulator sends a 5,000 megahertz signal through the wood. This aligns the glue molecules like metal filings on a magnet. "That's how we get absolute consistency from one bend to another, through all the arms. We actually change forever what this wood wants to do," Tom says. "If we do it right, when we rasp these arms—an hour of handwork per arm—you won't see the seams."

The division of labor at Thos. Moser Cabinetmakers is obvious. Tom has separated the workplace into a "machine" area with a concrete floor and a "people" area with a wooden floor, both equally important in creating truly fine furniture. But it's in the people area where the craftsmen at their own workbenches assemble the furniture. "These are the men and women who actually have their hands on the work that is going to people's homes," he notes. "They're my cabinetmakers."

To ensure more accuracy, such as in drilling, workbenches have three air lines to power pneumatic tools. "With air, they have more control, and it makes the workplace a lot quieter. Plus, there's no vibration," Tom says.

> "Well-designed furniture is a piece that nothing can be added to or taken away from."

"We use very low-tech finishing methods," Tom explains as he strides through the rows of naked furniture awaiting final finishing. "Lots of sandpaper, boiled linseed oil, and wax. Every piece is sanded to 400-grit, which polishes the wood. Then, we spray the oil on and let the piece sit before wiping off the residue. That's done three times. When the piece is dry, it's waxed with wax mixture, then buffed by hand."

But before a piece is oiled, it's signed by one of the cabinetmakers. "It's in ink and should last as long as the furniture."

Furniture that's worth more as it ages

The Shakers have noticeably influenced the designs of Thomas Moser, and he gives them due credit. "I like the work that they did between 1830 and 1850—the Golden Age of Shaker design," Tom comments. "I also respect the Scandinavian designers of the 1950s. To me, the economy of form and materials is important. I like quiet performance, and the Shakers and the Scandinavians understood this. Well-designed furniture is a piece that nothing can be added to or taken away from. It's a perfect balance."

Tom also believes that a well-designed piece of furniture will still look "at home" 100 years from now. And it should be worth more then. "I can't think of any major American furniture manufacturer whose products are worth more today than they were 20 years ago," he says. "But I would say that our furniture is. In fact, I'll buy back our furniture for three times what people bought it for—and be glad to because it appreciates. The chairs we now sell for $800 to $900 I used to sell for $240."

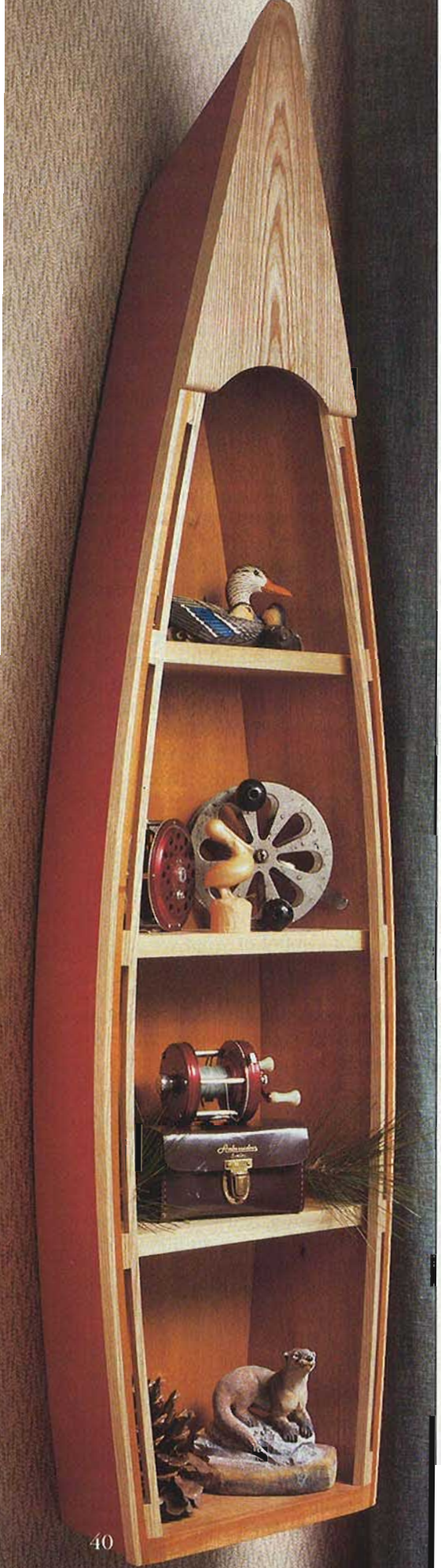
In Tom's view, of all the furniture in the Thos. Moser line, the Continuous Arm Chair probably fits his design parameters best. Sitting back in his desk's armchair, he almost seems to be thinking aloud: "If any piece of furniture goes on into the next century as kind of a symbol of what we are, it will be that. Maybe 100 years from now, somebody, someplace, is going to say, 'Oh yeah, there was a guy, there was a company in Maine, that made that chair.'"

Get a catalog from the cabinetmakers

For a copy of Thomas Moser's 38-page color catalog, send $3 to cover postage and handling to:

Thos. Moser
Cabinetmakers
Customer Service
P.O. Box 1237
Auburn, ME 04211-1237

Written by Peter J. Stephano with Larry Clayton
Photographs: John Kane/Silver Sun Studio
Graphic Design: Perry McFarlin



NAUTICAL

Looking for the perfect home accent to match your seafaring tastes? How about our novel boat shelf? Designed by Jim Shotwell, an accomplished boatbuilder and woodworker from Nescopeck, Pennsylvania, this folk art project lets you display a variety of unique collectibles–from antique fishing reels to miniature lighthouses. Jim refers to his boat shelf as the "Pooles Island Skiff."

Let's begin with the curved-sided boat bottom

Note: This project requires several thicknesses of mahogany and ash. Plane or resaw your own stock, or see the Buying Guide for our source of a hardwood kit.

1 Cut the bottom blank (A) to the size listed in the Bill of Materials from ⅝" stock (we used mahogany; ¾" mahogany plywood would also work).

2 Working on the bottom side of the bottom blank (A), mark the transom (B) and shelf locations (C, D). See the Bottom drawing on the Parts View on the WOOD PATTERNS® insert in the center of the magazine for reference. Now, mark the three nail-hole centerpoints for bending the fairing strips against in step 4. The fairing strip (a thin bendable piece of wood) allows you to mark a long smooth curve.

3 Cut a strip of wood to ¼×½×48" for use as a fairing strip.

4 Drive the nails about ¼" into the bottom blank at each marked nail centerpoint dimensioned on the bottom (A) of the Parts View drawing. Bend the fairing around the outside of the the nails, and clamp the ends of the strip to the bottom blank where shown in photo A. Now, mark a line along the inside edge of the strip as shown in photo A. Remove the nails and repeat the process to mark the opposite edge.

5 Mark the screw-hole centerpoints on the bottom side of the bottom for attaching the transom and shelves later. Drill a counterbored screw hole through each screw-hole centerpoint.

6 Form the 15° bevel along the side edges of the bottom by tilting your bandsaw table 15° from vertical and making the cuts; or you can make a square cut on the side edges with your bandsaw or jigsaw, and disc-sand them at 15°.

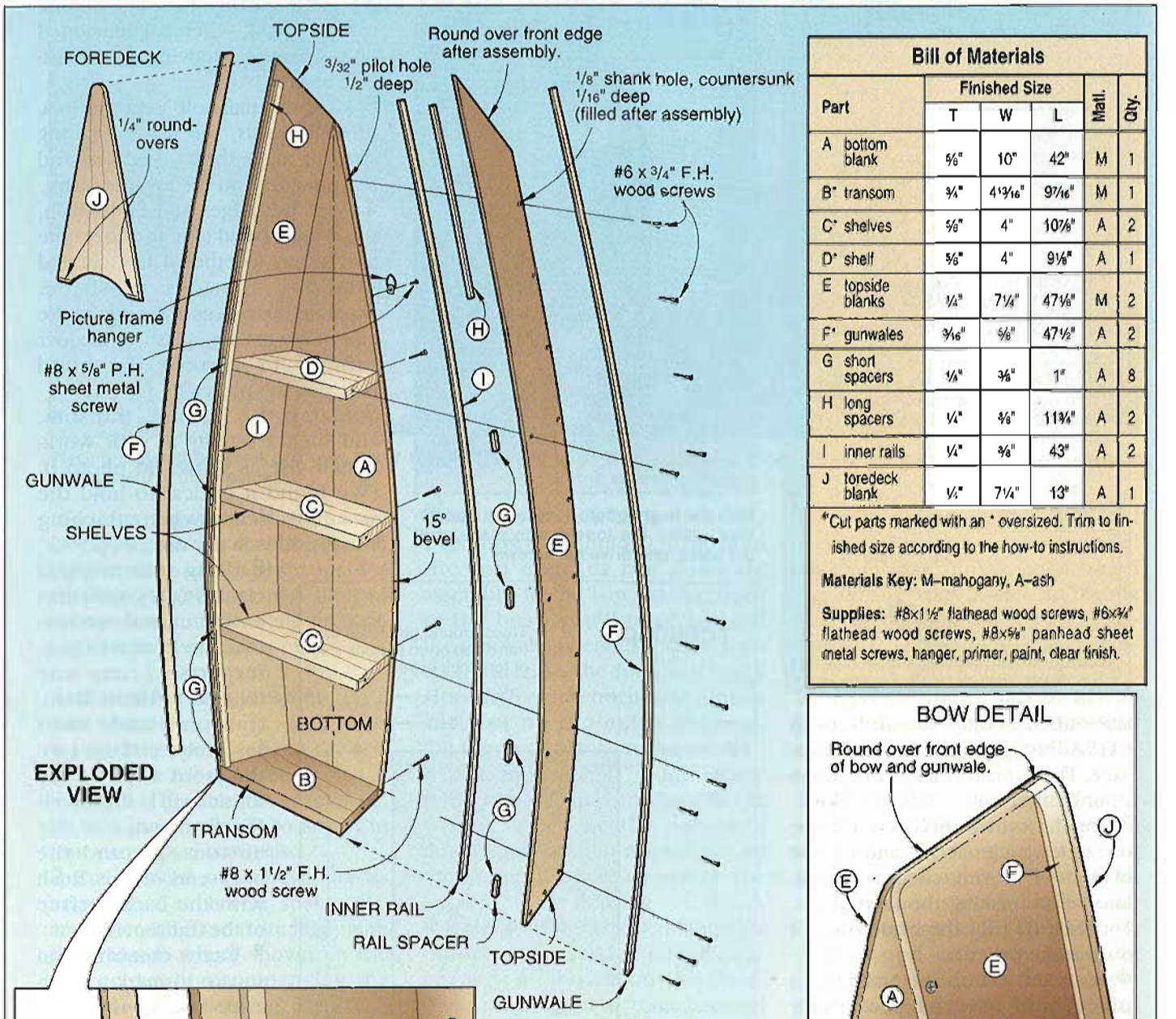
Trace along the inside edge of a flexible strip of wood to mark the curved edges to form the bottom piece.

Add the transom and shelves

1 Cut the transom (B) and shelves (C, D) to the sizes listed in the Bill of Materials plus 1" in length.

2 Add a wood extension to your miter gauge. As shown on step 1 of the Miter-Cutting the Transom and Shelves drawing, angle the gauge 15° from center and tilt the blade 8° from vertical. Make the cut shown in step 1 to miter-cut one end of the transom (B). Tilt the miter gauge 15° in the opposite direction as shown in step 2. Mark the cutline and hold the transom against the bottom (A) to ensure the outside edges of the transom will be flush with

KNICKKNACK



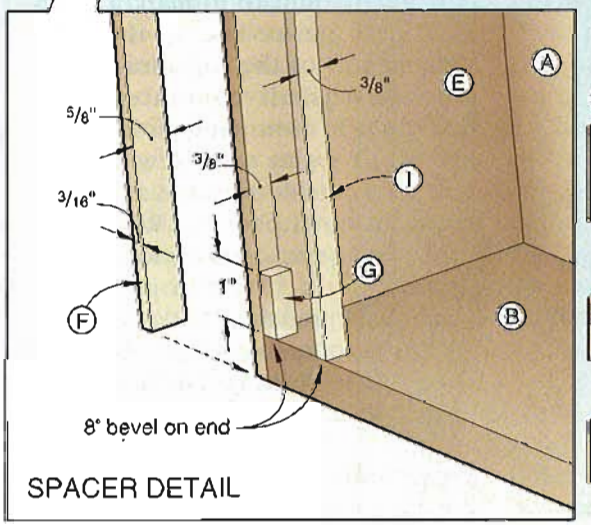
Bill of Materials

Part	Finished Size T	W	L	Matl.	Qty.
A bottom blank	5/8"	10"	42"	M	1
B* transom	3/4"	4 13/16"	9 7/16"	M	1
C* shelves	5/8"	4"	10 7/8"	A	2
D* shelf	5/8"	4"	9 1/8"	A	1
E topside blanks	1/4"	7 1/4"	47 1/8"	M	2
F* gunwales	3/16"	5/8"	47 1/2"	A	2
G short spacers	1/4"	3/8"	1"	A	8
H long spacers	1/4"	3/8"	11 3/8"	A	2
I inner rails	1/4"	3/8"	43"	A	2
J foredeck blank	1/4"	7 1/4"	13"	A	1

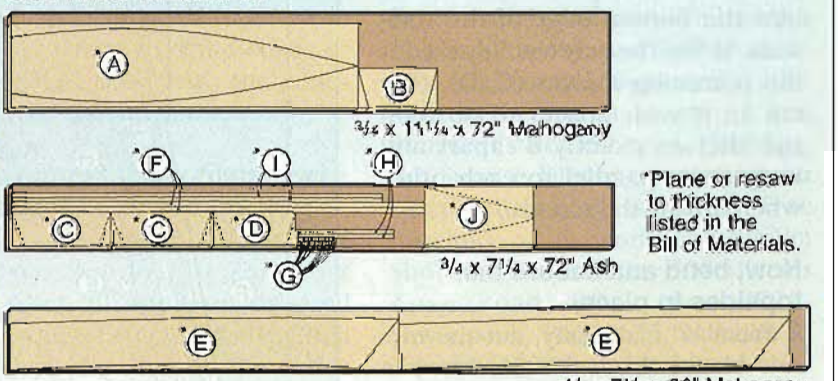
*Cut parts marked with an * oversized. Trim to finished size according to the how-to instructions.

Materials Key: M–mahogany, A–ash

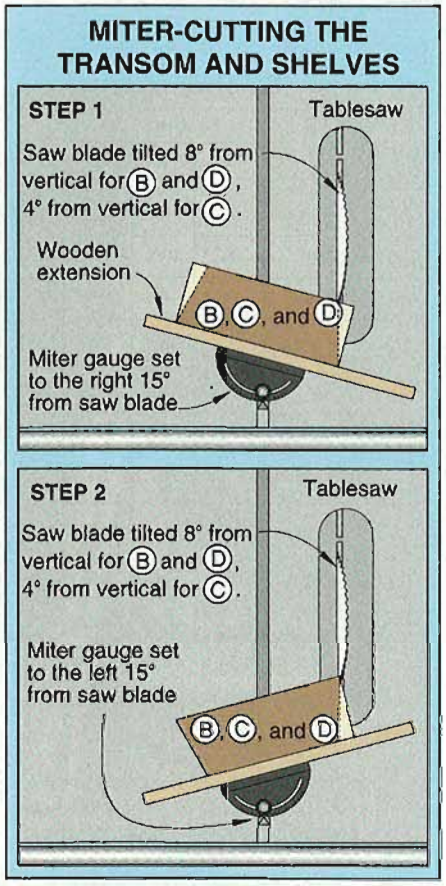
Supplies: #8x1 1/2" flathead wood screws, #6x3/4" flathead wood screws, #8x5/8" panhead sheet metal screws, hanger, primer, paint, clear finish.



CUTTING DIAGRAM



*Plane or resaw to thickness listed in the Bill of Materials.


MITER-CUTTING THE TRANSOM AND SHELVES
STEP 1
Tablesaw
Saw blade tilted 8° from vertical for B and D, 4° from vertical for C.
Wooden extension
B, C, and D
Miter gauge set to the right 15° from saw blade
STEP 2
Tablesaw
Saw blade tilted 8° from vertical for B and D, 4° from vertical for C.
Miter gauge set to the left 15° from saw blade
B, C, and D

the outside edges of the bottom (A). Adjust your cutline if necessary. Then, make the second compound miter cut.

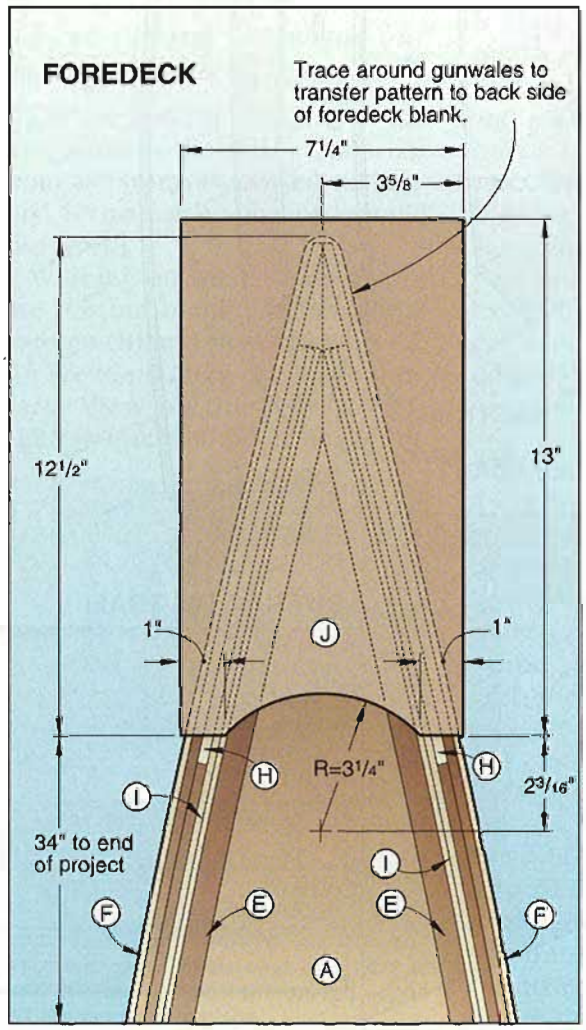
3 For the center shelves (C), leave the miter gauge at 15° and tilt the blade to 4°. Again, check your cutline before making the second cut. For shelf (D), tilt the blade back to 8° to make the cuts.

4 Glue and clamp the transom in place, and use the previously drilled holes in the bottom (A) as guides to drill a pair of pilot holes into the bottom edge of the transom. Drive the screws. Repeat for the remaining shelves (C, D). (We cut an 8"-wide spacer to position the shelves exactly 8" apart and keep them parallel to each other when driving the screws.)

Now, bend and secure the topsides in place

1 From ¼" mahogany, cut the topside blanks (E) to the size listed in the Bill of Materials.

With the boat bottom secured in a bench vise, clamp the topsides in place, drill the holes, and drive the screws.



2 Mark the angled bow line on one topside blank where dimensioned on the Topside drawing on the pattern insert.

3 Mark the nail-hole centerpoints, drive the nails, and use the fairing strip to mark the curved top and bottom edges on the topside blank.

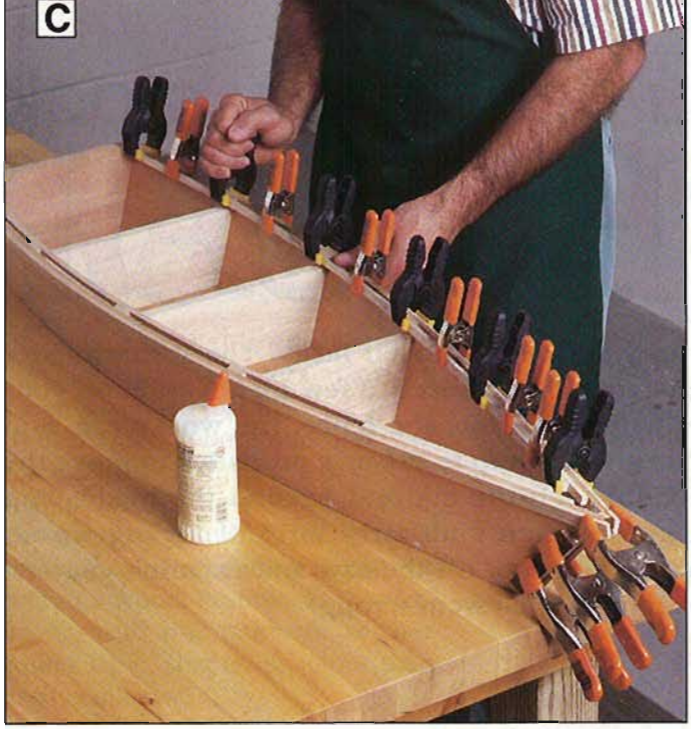
4 With the edges and ends flush, use double-faced tape to adhere the two blanks together. Then, cut and sand the topsides to shape. Separate the pieces and remove the tape. (We used a splash of lacquer thinner to weaken the bond between the pieces.)

5 Clamp the bottom, transom, and shelf assembly to your workbench vise as shown in photo B. (We found it critical to hold the assembly steady when attaching the topsides in the next step.)

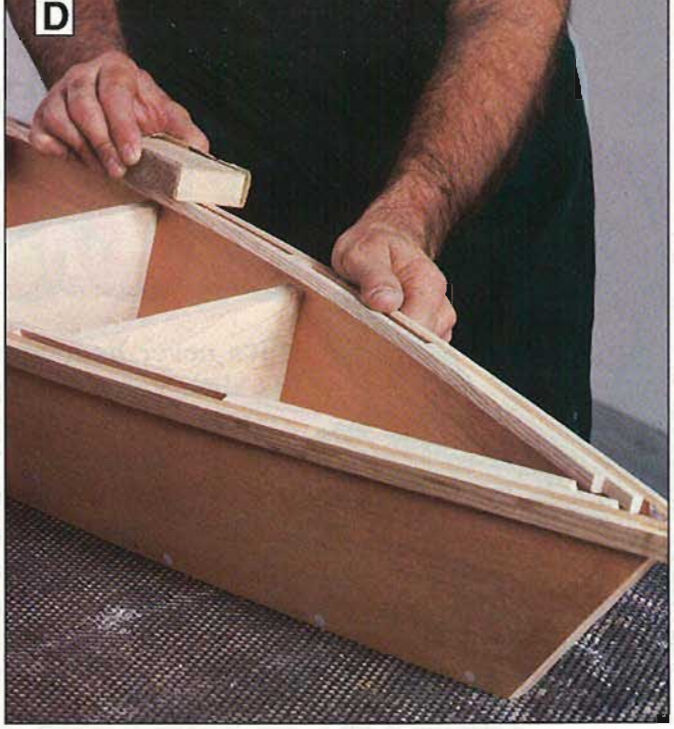
6 Using rubber-tipped clamps (they slide less on the curved surfaces than their metal counterparts), clamp one topside to the bottom, transom, and shelf assembly, making sure the front edge of the topside (E) is flush with the front edge of the bottom (A), and the back end of E is flush with the back surface of the transom (B).

7 Use a combination square to mark a reference line up the sides of the topsides. Then, drill counterbored mounting holes, and glue and screw the topside in place as shown in photo B. Repeat for the opposite topside.

8 Cut two pieces of stock to ¼×¾×5" to act as clamp blocks. Adhere these to the front of the topsides with hotmelt adhesive, and use these to clamp the front ends of the



Placing a clamp between and over every spacer, glue the rails and spacers to the topsides.



Use a sanding block to sand the top edge of the gunwale assembly flush.

topsides together. Without the blocks, the clamps tend to slide off the topsides. With the topsides squeezed together, run a fillet of epoxy on the inside along the mating joint between the topsides.

And now for the gunwales and spacers

1 Cut the gunwales (F) to the size listed in the Bill of Materials plus 2" in length. Then, cut the spacers (G, H) and inner rails (I) to size. Cut four extra spacers (G) also.

2 Cut or sand an 8° bevel across one end of each rear spacer (G) and inner rail (I) to mate flush with the transom where shown on the Spacer detail accompanying the Exploded View drawing.

3 As shown in photo C, glue and clamp the gunwale, spacers, and inner rail to one side of the boat, keeping the top edges flush. To keep a continuous curve to the inner rail when clamping it in place, use an extra spacer (not glued in place) and clamp between the glued-in-place spacers. Repeat on the opposite side.

4 Trim the rear ends of the gunwales (F) flush with the back surface of the project.

5 Sand the bow to the shape shown on the Bow detail.

6 Cut the foredeck blank (J) to size.

7 As shown in photo D, hand-sand the top edge of the gunwale assembly flush. Toward the front of the boat, you'll need to sand the gunwale assemblies flush with each other, so the foredeck blank sits flush with both assemblies and that no gap exists between the foredeck blank and gunwales.

8 Mark and cut a 3¼" radius on the wide end of the foredeck blank where shown on the Foredeck drawing. Rout a ¼" round-over on the foredeck where shown on the Exploded View drawing.

9 Hold the foredeck blank against the front top surface of the project where shown on the Foredeck drawing, and trace around the gunwales onto the foredeck blank. Cut the foredeck to shape.

10 Glue and clamp the foredeck to the boat. Then, sand the edges of the foredeck flush with the edges of the gunwales and bow.

You're almost there, mate; just fill the holes and add the finish

1 Using wood putty, car-body filler (we used Bondo), or Zar latex wood filler, fill the counterbored screw holes. Later sand the filled holes flush. Finish-sand the entire boat project.

2 Apply a clear finish to the boat interior and gunwales (we used satin polyurethane). Then, mask off the clear-coated areas, andprime and paint the topsides' (E) and bottom's (A) exterior with spray enamel or paint with a foam brush. (We sprayed on three coats of Krylon Burgundy, being careful to avoid runs. Later, remove the masking.)

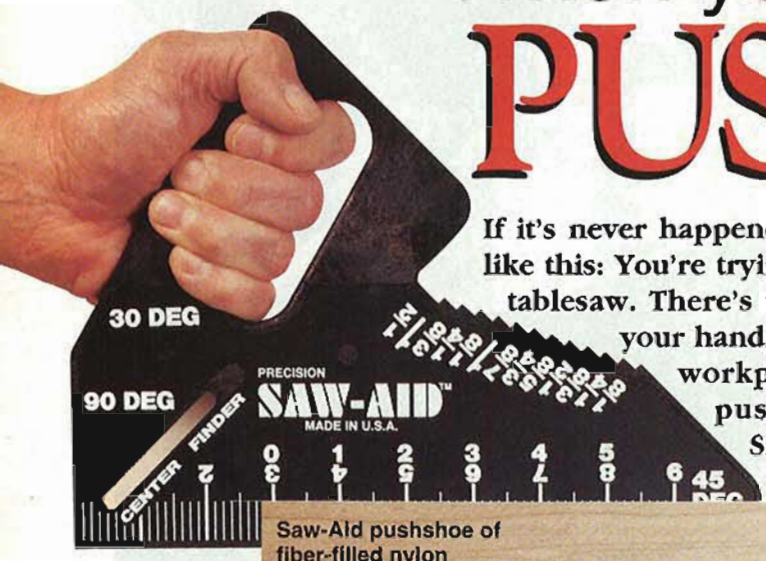
Buying Guide

Hardwood kit. All the individual pieces shown on the Cutting Diagram cut oversized from the thickness and species listed in the Bill of Materials. Kit no. W1071, $89.95 ppd.. Heritage Building Specialties, 205 North Cascade, Fergus Falls, MN 56537. Call 800/524-4184 to order.

Boat and brochure. To order a finished Pooles Island Skiff Shadowbox (signed and numbered), a kit for the same, a copy of Jim Shotwell's newest book (Building the Sunrise Dinghy), register for a boatbuilding class, or a free brochure of his work, contact Jim Shotwell-Boatbuilder, 100 Diana's Cove Road, RR 2, Box 2718, Nescopeck, PA 18635; call him at 717/759-1290, or visit his website at www.jimshotwellboats.com

Written by Marlen Kemmet Project Design: ©James Shotwell Illustrations: Kim Downing Photographs: Hetherington Studio

When you rip narrow stock PUSH YOUR



Saw-Aid pushshoe of fiber-filled nylon

If it's never happened to you, count yourself lucky. The scenario goes like this: You're trying to rip a board barely a few inches wide on your tablesaw. There's the whirling blade, the fence, the workpiece, and your hand. You grab a scrap to use as a pushstick to move the workpiece through the cut and beyond the blade. You push, guide, then suddenly WHAM! Flying wood. Shaking, you shut off the saw and examine yourself for injury. What went wrong?

How pushstick accidents happen

Here's why such accidents happen: The pushstick hits the blade and breaks or gets kicked back. Simple enough. But the pushstick wouldn't have contacted the blade if it hadn't been too thick, or if it hadn't slipped off the workpiece. There are contributing factors, too, such as having the blade raised too high through the workpiece (⅛" to ¼" of teeth should extend above the wood). To avoid accidents with pushsticks, it's good to understand why and where you should use them.

Stock less than 5" wide is considered narrow stock, and your hand guiding it across the tablesaw while ripping won't pass safely between the blade and the fence. That's where a pushstick comes in. But there are a few guidelines to keep in mind.

So that it won't hit the blade, your pushstick should always be thinner than the distance between the saw blade and the fence. That is, it should never be thicker than the width of the stock you're ripping. Ideally, you should have several pushsticks on hand—each of a different thickness—to use with wood of varying widths.

Choose a pushstick style that works best for you

A pushstick can take many a shape. The most common shopmade, wooden pushsticks appear as extensions of your index finger, but angled to exert pressure on the stock. The business end has a notch to engage the end of the wood; the grip end is rounded to comfortably accommodate your hand, and usually has a hole for hanging at or near the tablesaw.

There's another type of pushstick that takes a saw-handle or shoe shape, as shown in the homemade example, *opposite page.* This type provides greater contact with the surface of the workpiece and offers a surer grip for your hand.

The shopmade pushbox takes the handle or shoe shape another step. This type rides the fence, contacts a greater area of the workpiece, and positions your pushing hand well away from the blade. Shown *opposite page,* it's suited for thin-strip ripping.

Of course, you can buy ready-made pushsticks in several shapes, styles, and made of various materials. The models shown on these

Know the proper way to push

Just as a refresher, here's how to rip narrow stock: Standing to the left of and out of the way of the blade, use your right hand to push the board forward and your left (or a feather board) to hold it firmly against the fence to start the cut. When the workpiece clears the front edge of the tablesaw, grab the pushstick with your right hand and use it to complete the cut, as shown *left.* Don't remove the pushstick until you have moved the stock beyond the blade. Turn off the saw and retrieve the wood. Never ever reach across the blade to pick up the workpiece.

Written by Peter J. Stephano Photographs: John F. Schultz; Wm. Hopkins

WAY TO SAFETY

pages are available from woodworking supply dealers at prices ranging from $6 to $20.

Pushblocks, in both one- and two-hand styles, hold the workpiece firmly against the saw table with downward pressure. A friction pad on their sole keeps them in contact with the wood. Pushblocks, however, normally find more use at your router table, shaper, or joiner than at the tablesaw.

The difference that material makes

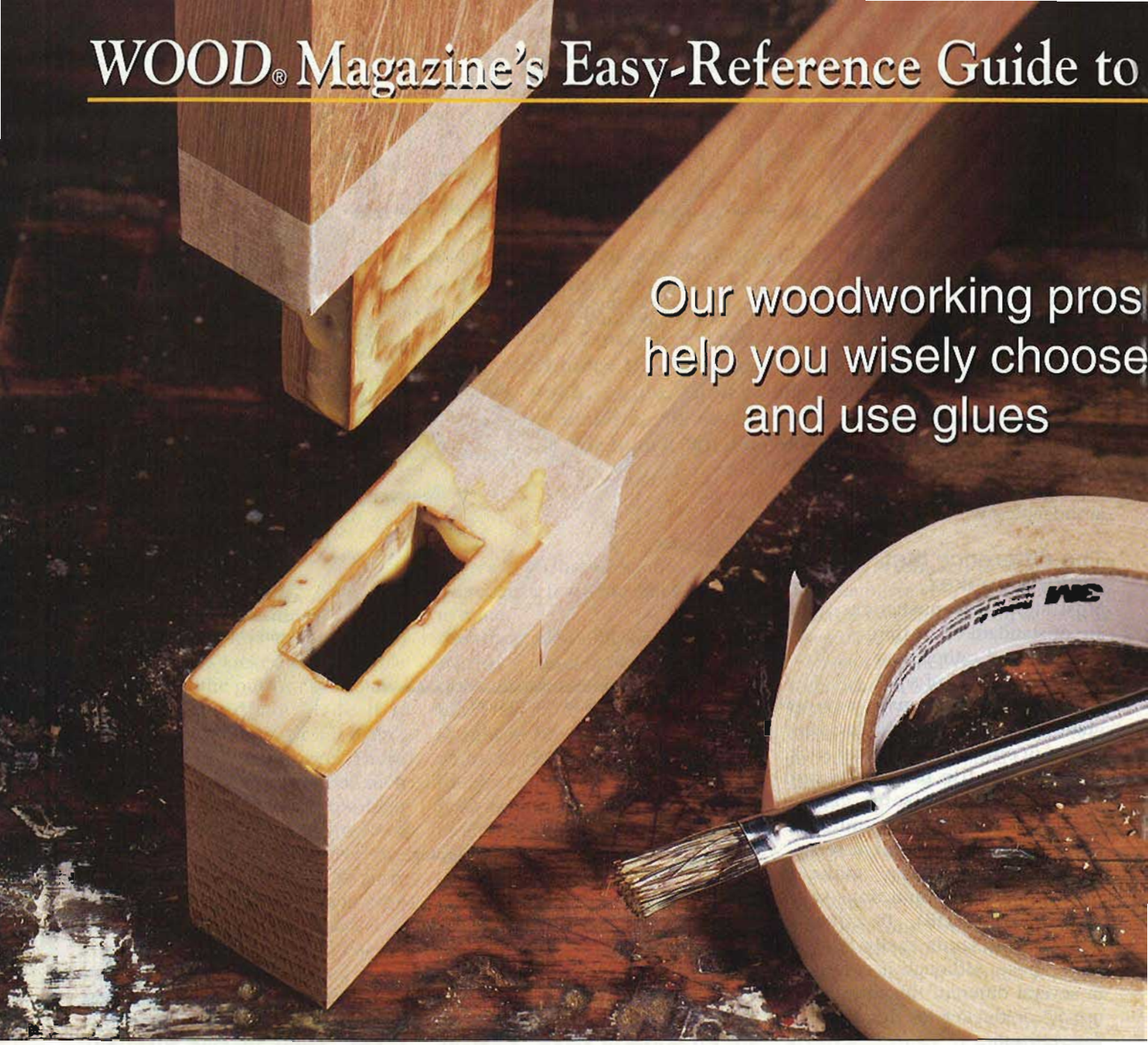
Most shopmade pushsticks are of standard ¾" or thinner plywood rather than cut from a board of solid stock. That's because grain direction presents a breakage hazard in other than a straight stick. However, Baltic birch plywood proves a stouter, safer choice because it has no voids and more plies. Another good, solid material from which to make pushshoes is medium density fiberboard (MDF). It cuts, shapes, and sands easily, and takes abuse. Although it comes in several different thicknesses, use ⅜" or thicker for durability and strength.

Store-bought, molded pushsticks made of hard plastic are inexpensive and well designed. But when a blade hits them, they can fragment or even shatter. More durable are ones manufactured from ABS plastic—a softer, resilient material—or of fiber-filled nylon. Aluminum pushsticks, while they won't harm your saw blade if they contact it, can throw flak back at you.

Ready-made pushsticks and -blocks shown available from Eagle America. Call 800/872-2511 for a free catalog.

Baltic birch pushstick
Plastic Power-Hands pushshoe has rubber sole.
Aluminum pushsticks often have metric rule on blade.
Shoe-style stick made from MDF
Pushbox built for thin-strip ripping
Molded, hard plastic pushstick
Hard plastic pushblocks, above and below, feature friction cushions.

WOOD® Magazine's Easy-Reference Guide to



Our woodworking pros help you wisely choose and use glues

With all of the gluing products on the market today, choosing the right type for your needs, and using it correctly, can get tricky. For help, we turned to the *WOOD* magazine staffers who design and build the projects featured in our publication: Jim Downing, Jan Svec, and Chuck Hedlund. We'll tell you about the eight types they rely on, and share their tips for using each successfully.

First, choose the glue that's right for the job

The first time you glued two pieces of wood together, you probably reached for your bottle of good ol' yellow woodworker's glue. It worked, so you stuck with it. But if you've ever wondered if there's a better glue for a particular job, check our chart at *right*, and be confident in your choice. Make a copy of this chart and post it near where you store your glues, and you'll never again scratch your head over which glue to use.

Our pros' best gluing tips

One sure way to gauge the expertise of a woodworker is to examine the joints on his projects. Are they free of glue squeeze-out and rock-solid, even after many years of use? If so, he probably learned (the hard way, in some cases) many of the tips we'll share here. Beginning on *page 48*, you'll learn how to use each of the eight glues in the chart, but since yellow, white, and water-resistant glues are similar in the way you apply, work, and clamp them, we'll discuss them together.

WOODWORKING GLUES

WHAT'S WHAT IN WOODWORKING GLUES

GLUE TYPE	OPEN TIME (1)	MINIMUM CLAMP TIME	CLEANUP (2)	COLOR WHEN DRY (3)	SHELF LIFE (4)	APPROXIMATE COST PER OUNCE (5)	KEY PROPERTIES	TYPICAL PROJECTS
YELLOW (ALIPHATIC RESIN)	5 - 10 minutes	30 minutes	Water, damp cloth.	Yellow*	1 year	$ .36	Fast tack time. Excellent for general use.	Indoor furniture and cabinets.
WHITE (POLYVINYL ACETATE)	10 - 15 minutes	60 minutes	Water, damp cloth.	Clear	2 - 3 years	.24	Longer open time than yellow glue. Inexpensive.	Cribs, galley rails, and complex casework.
WATER-RESISTANT	5 - 10 minutes	60 minutes	Damp cloth before setting, scrape or sand after setting.	Yellow	1 year	.37	Fast tack time. Water resistant.	Sheltered outdoor furniture and outdoor riding toys.
POLYURETHANE	30 minutes	4 hours (less in high humidity)	Tools: mineral spirits. Hands: soap and water before cured.	Yellow	1 year unopened, 6 months opened*	1.11	Waterproof. No mixing required. Gap-filling.	Exposed outdoor projects and planter boxes.
EPOXY	5 minutes - 12 hours (depending on formulation)	Varies	Tools: acetone. Hands: Nitro-Kleen,* rubbing alcohol.	Clear (can be changed with filler)	1 year	1.25	Waterproof. High strength. Bonds even oily woods such as teak. Excellent for end-grain joints. Gap-filling.	Boatbuilding, threaded parts on shop jigs, and furniture repair.
INSTANT (CYANOACRYLATE)	15 seconds	0 - 1 minute	Acetone	Clear	1 year unopened, 6 months opened*	5.00	Bonds instantly (with accelerator). Works well for bonding solid-surface materials.	Model building, and fragile carvings and turnings.
HOTMELT	2 - 45 seconds	0 - 15 seconds	Let harden, then gently scrape. Remove residue with mineral spirits.	Clear or yellow	2 years	.53	Excellent for crafts. Sets quickly without clamping. Good temporary bond.	Crafts, temporary fastening of parts, and holding small parts for routing.
CONTACT CEMENT	15 minutes - 3 hours	Clamping not necessary	Mineral spirits,** Soap and water when wet, xylene solvent when dry.***	Clear	1 year	.16* .25**	Adheres large surface areas.	Plastic-laminate countertops and flexible veneers.

NOTES:

1. Open time refers to how much time you have, after the glue is applied, to complete the job.
2. (*) A citrus-based hand-cleaner (**) Solvent-based formula (***) Low-solvent, water-based formula
3. (*) Also available in dark-colored formula for use with darker woods.
4. Assuming proper storage and handling. (*) Exposure to air can quickly reduce shelf life.
5. (*) Solvent-based formula (**) Low-solvent, water-based formula

Why not hide glue?

Antique furniture restoration experts and some woodworking purists may wonder why we don't use hide glue in our shop. Historical considerations aside, hide glue's chief advantage—its extremely long open time—is also its chief disadvantage. Jan says, "We just never use it. White and yellow glues allow enough open time for virtually any assembly you're likely to run across, and you won't need to wait overnight for every joint you clamp. Also, unlike joints made with hide glue, joints made with these glues won't weaken over time."

Continued

Woodworking Glues

Yellow, white, and water-resistant glues: the old standbys

You probably use one or more of these three similar glues more often than any other type—with good reason. They are versatile, easy-to-use, and affordable, and they provide strong bonds. The next time you reach for one of these glues, consider trying the following:

•For the strongest bond, make sure your pieces fit together well. Then cover both joining surfaces with a thin layer of glue. You can

spread it with a brush, a paint roller, or Jim's favorite—the plastic core of a disposable foam paintbrush as shown *above.*

•Clamp with even pressure all along the joint, but not too hard or you'll squeeze all the glue out and make a weak joint.

•For small areas, mask the wood adjacent to the joint with masking tape to prevent the squeeze-out from getting on your work. For longer joints, remove the squeeze-out with a damp cloth while it's still wet, "rolling" the cloth as you go to keep from smearing the excess glue on the adjacent surfaces.

•To minimize squeeze-out on the face side of your projects, Chuck suggests you bring the two pieces together at a slight angle, joining the face edges first as shown *right.* As you lay the pieces flat to clamp them, most of the squeeze-out will be on the back side.

Here are a couple of tips that apply only to water-resistant glue:

•It tends to separate, so mix it well before each use.

•Wear your shop apron when using water-resistant glue—it doesn't wash out of clothing.

Polyurethane glue: the promising newcomer

Before this glue debuted on the market a few years ago, you had to mix two components together to create a waterproof glue. Not any longer. For your outdoor projects, give this glue a try and you'll like it—just keep the following points in mind:

•This product needs a little moisture to make a strong bond. So before applying polyurethane glue to dry woods, wipe the area to be joined with a damp cloth.

•After clamping, the squeeze-out will appear as a brownish foam. Chuck says, "Resist the temptation to wipe it off when it's wet, or you'll end up with a sticky mess." After this foam hardens it can be cleaned up by slicing it off with a sharp chisel, bevel side down, working the edge across the joint.

•Buy only as much as you'll use in a year because humidity can cause this glue to prematurely turn to a useless gel. Extend the shelf life by keeping the glue bottle closed as much as possible.

Epoxy: tough-as-nails

If you need to join different materials such as metal or glass to wood, or if you're working with an oily wood such as teak, use epoxy. Just follow the mixing instructions on the package and these tips:

- Most epoxies mix to a thick, gooey consistency. But for more versatility choose a thin, two-part epoxy to which you can add silica thickener—it's the strongest thickener you can add.
- Keep lots of waxed paper handy when using epoxy. Use it to protect surrounding work areas from accidental bonding.
- Use just enough clamping pressure to keep the joint from moving while it sets. Too much clamping force starves the joint of glue, and the remainder absorbs into the wood.
- For strong end-grain joints, Jim says, "First, saturate the wood on both sides of the joint with a coat of the thin epoxy. Then mix up another batch, this time adding silica thickener. Apply the thickened epoxy over the thin layer, and clamp."
- Warm temperatures cause epoxy to set faster. So if you need more working time, keep the mixture cool by placing your mixing container in an ice bath as shown in the photo *left*.

Continued

Woodworking Glues

Instant (cyanoacrylate) glue: holding fast

This glue has been around since the guy on TV glued his head to the bottom of a steel girder, but you may not have thought about using it in your woodshop. Here are some "instant" ideas:

•For joining wood, pick an instant glue with a thick or gel consistency—a thin instant glue absorbs into the wood, robbing the joint of glue.

•Use a drop or two of a thin instant glue on fragile parts of wood turnings or carvings. It quickly absorbs into the wood and fortifies it.

•You can use a spray-on "accelerator" that makes the bond instantaneous. To do this, apply accelerator to one side of the joint, instant glue to the other, and join them. But, use just a light spray because too much accelerator will actually weaken the bond. Most stores catering to the needs of modelbuilders carry instant glue accelerators.

•For tough-to-clamp pieces that require precise positioning, like the broken letter in the scroll-sawn sign *below*, try this. Apply instant glue, position the pieces while the glue is still workable, then hit the joint with a spritz of accelerator. The accelerator will seep into the joint and bond the pieces instantly.

•Instant glues work well for joining solid-surface materials, such as Corian. But, the joint requires just the slightest moisture for full strength, and solid-surface materials are bone-dry.

To get the best joint, clean the surfaces to be joined, then wipe one of the surfaces with a damp paper towel (or you can simply breathe on the surface—there's adequate moisture in your breath). Apply instant glue in a thin, even coat to the other piece, then position and clamp the joint as tightly as you can with a screw-type clamp. Leave the pieces clamped for 10 minutes. After 20 minutes, you can machine the joint.

Hotmelt glue: the temporary fixer

Crafters have used these little sticks of hotmelt glue for years because it sets fast without clamping, and easily joins dissimilar materials that aren't under a lot of stress. So, grab your gun and remember these tips:

•Hotmelt glues are great for temporarily holding workpieces in position so you can join them with fasteners. For example, Jim positions false drawer fronts with the help of two spots of hotmelt glue as shown *below*. Then, he fastens the front to the drawer with screws.

•The hotter the glue, the better the bond. So give the glue gun at least five minutes to warm the glue fully before you begin, and work quickly—the glue begins to cool right after it leaves the gun.

•If you need more open time, warm your shop and materials to around 90°—maybe with a heat gun on a low setting. You'll gain a few seconds.

Contact cement: for the really big job

When gluing together two large surfaces, such as veneer to plywood, you can't beat contact cement. Spread the cement on both pieces, let them set, touch them together, and they're bonded! Here are a few things to keep in mind when working with contact cement:

•If you have a choice, buy the low-solvent (water-based) type. It's more expensive than the solvent-based formulas, but it covers about twice as much surface area. The fumes are nonflammable so you won't risk an explosion, and cleaning hands and tools is a snap with just soap and water or a citrus-based solvent.

•Jan uses a small short-nap paint roller to apply the cement. It provides a smooth and consistent layer, which is especially important when gluing flexible veneer. And, he says, buy the best roller you can. "Inexpensive rollers fall apart when used with solvent-based cements."

•The cement is ready when it appears dull and becomes just slightly tacky to the touch (from 5 to 15 minutes).

•As the name implies, contact cement bonds on contact, so have a helper handy to keep the veneer off the substrate until you can position it. Starting from one end, press it down with a 3" rubber J-roller, rolling down the center first as shown in the photo *below*, then rolling out to the edges from there. Roll the entire surface to make sure the two surfaces make good contact.

WHERE TO CALL FOR MORE INFORMATION

If you'd like more information about glues, contact these manufacturers:

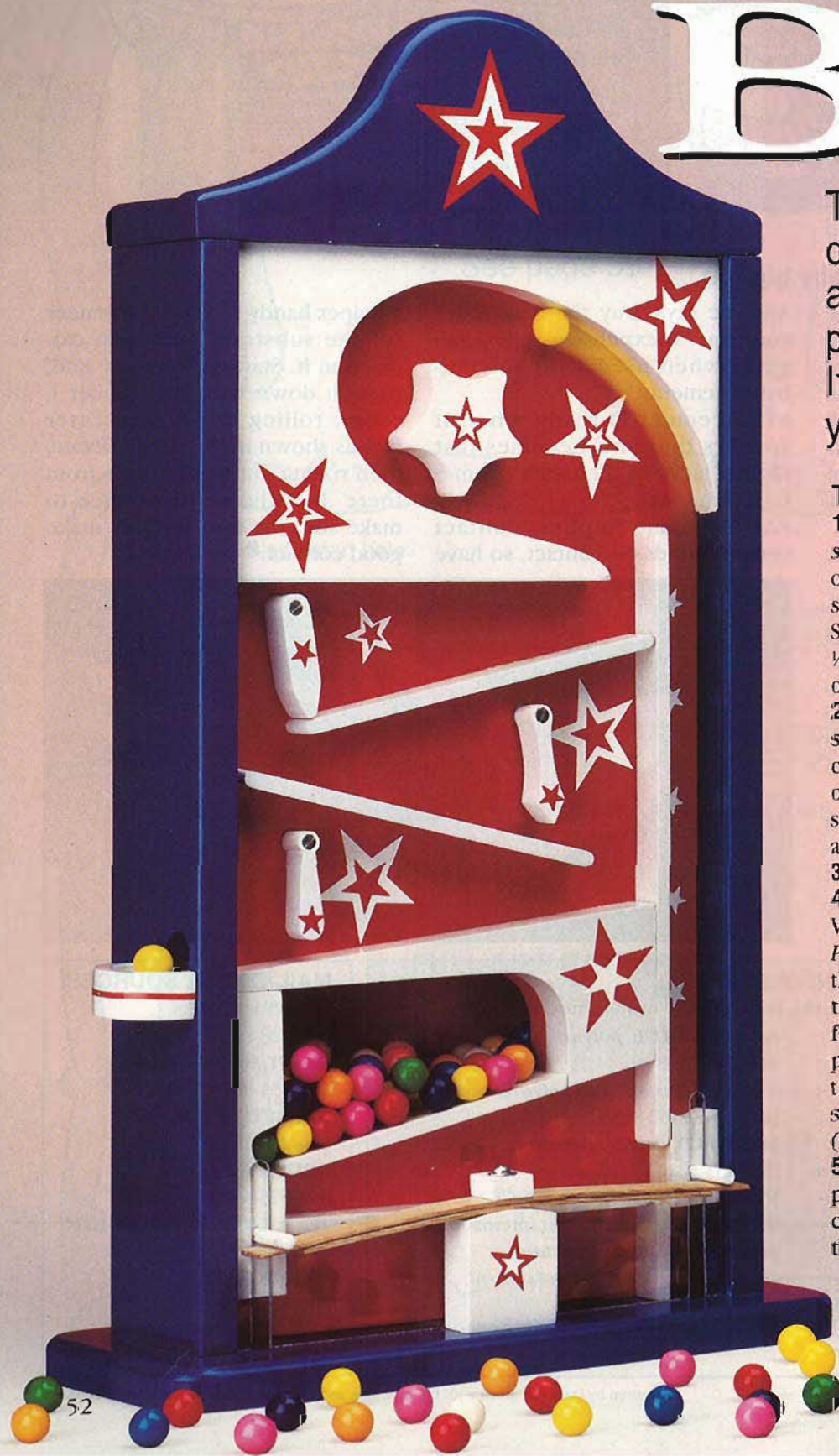
ARROW, *hotmelt glue*, 201/843-6900
DAP/WELDWOOD, *contact cement*, 800/327-3339
DEVCON, *epoxy and instant glues*, 800/375-2525
ELMER'S, *yellow, white, water-resistant, polyurethane, epoxy, instant, and contact cement*, 800/848-9400
EXCEL (from AmBel Corp.), *polyurethane glue*, 800/779-3935
FORMICA (from TACC International), 516/623-6000
GORILLA GLUE, *polyurethane glue*, 800/966-3458
LOCTITE, *instant and polyurethane glues*, 800/562-8483
LOKWELD, *contact adhesive*, 800/433-3222
SYSTEM THREE, *epoxy*, 206/782-7976
TITEBOND (from Franklin International), *yellow, white, water-resistant, polyurethane, and contact cement*, 800/347-4583
WEST SYSTEM, *epoxy*, 517/684-7286

MAIL-ORDER SOURCES:

CONSTANTINE'S, 800/223-8087
CRAFT SUPPLIES, USA, 800/551-8876
GARRETT WADE, 800/221-2942
GRIZZLY, 800/523-4777
TOOL CRIB OF THE NORTH, 800/358-3096
WOODCRAFT, 800/225-1153
THE WOODWORKERS' STORE, 800/279-4441

Written by Dave Campbell with Jim Downing and Bill Krier Photographs: Marty Baldwin

Have a Ball



This colorful machine delivers gum balls, along with exciting pinball-style action. It's just the thing for your game room.

The frame starts the game

1 Cut the sides (A) to the size shown in the Bill of Materials. Saw or rout ½" and ⅛" grooves where shown on the Groove detail and Side Section View drawings. Rout a ⅛" round-over along all four edges of each piece.

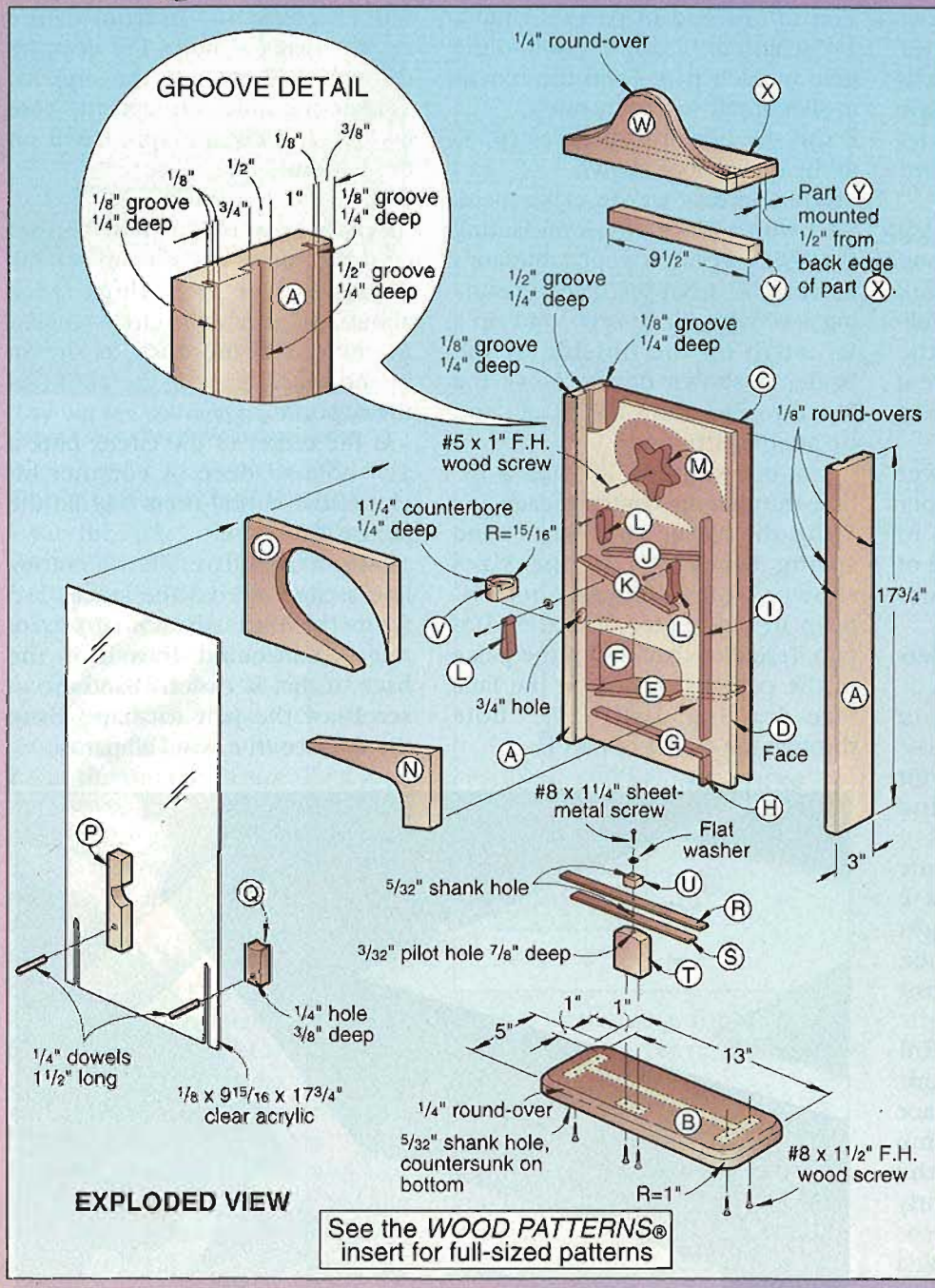
2 Cut the base (B) to the dimensions shown. Lay out the 1"-radius corners on the base, and scrollsaw or bandsaw them. Sand the edge smooth, then rout a ¼" round-over around the top of the base.

3 Cut parts C and D to size.

4 Photocopy the Full-Size Front View drawing (it's in the *WOOD PATTERNS*® insert in the middle of the magazine), and trace the cutting line for the opening onto the face (D). Trace the outlines for parts G, H, I, J, K, N, and O onto the face, and mark centers for screw pilot holes for the flippers (L) and spinner (M).

5 Drill 1/16" pilot holes for the flipper and spinner screws, using a drill press to keep them square to the surface.

This gum ball machine delivers excitement



See the *WOOD PATTERNS*® insert for full-sized patterns

Bill of Materials

Part	Finished Size T	W	L	Matl.	Qty.
A sides	3/4"	3"	17 3/4"	P	2
B base	3/4"	5"	13"	P	1
C back	1/8"	10"	17 3/4"	H	1
D face	1/2"	10"	17 3/4"	PW	1
E* loading ramp	1/4"	2 1/4"	9 3/4"	P	1
F* bevel block	1 1/2"	2"	3"	P	1
G lower ramp	1/4"	3/4"	7 9/16"	P	1
H lower guide	1/4"	3/4"	1 5/16"	P	1
I upper guide	1/4"	3/4"	11 1/16"	P	1
J upper ramp	1/4"	3/4"	6 7/8"	P	1
K middle ramp	1/4"	3/4"	6 1/4"	P	1
L* flippers	5/8"	5/8"	2"	P	3
M* spinner	5/8"	3" dia.		P	1
N* delivery ramp	3/4"	3 7/8"	8 1/4"	P	1
O* loop	3/4"	5 1/2"	9 1/2"	P	1
P* loading block	5/8"	1"	4 15/16"	P	1
Q* firing block	5/8"	1"	1 7/16"	P	1
R upper spring	1/16"	3/4"	9 1/2"	O	1
S lower spring	1/16"	3/4"	7 7/8"	O	1
T spring support	3/4"	1 3/4"	1 15/16"	P	1
U spring block	3/8"	3/4"	3/4"	P	1
V* delivery cup	3/4"	1 1/4"	1 7/8"	P	1
W arch front	3/4"	4"	11"	P	1
X top	3/4"	2 1/4"	11"	P	1
Y plug	3/4"	7/8"	9 1/2"	P	1

*Make oversize initially, then cut to finished size in accordance with how-to instructions.

Materials Key: H–hardboard, O–oak, P–pine, PW–plywood

Supplies: 1/8" clear acrylic sheet, 1/4" dowel rod, #5x1" flathead wood screws, #8x1 1/4" panhead sheet-metal screw, #8x1 1/2" flathead wood screws, flat washers, paint, decorative stickers.

6 Bandsaw the opening in the face.

7 Dry-assemble the sides (A), back (C), and face (D). Clamp together, and position on the base (B) where shown. Mark and drill 3/32" holes through the base and 1" deep into the sides (A). Enlarge the holes through the base to 5/32", and countersink them on the bottom. Disassemble, and sand all parts.

8 Glue and screw the sides (A) and base (B) together. Slide the back (C) and face (D) into place for spacing, but don't glue them yet.

9 Cut a piece of 1/8" acrylic to 9 15/16×17 3/4". Drill 5/16" holes at the centers shown on the Full-Size drawing, then cut the slots.

Continued

Have a Ball

Add the ramps and flippers

1 Adhere a copy of the part E Top View Pattern to a piece of ¼×2¼" stock about 10" long. (Rubber cement or spray adhesive will hold the pattern.) Scrollsaw or bandsaw the notches. Sand three bevels and a radius where shown on the Front View Pattern.

2 To make part F, tilt your tablesaw blade to 45°, and bevel-rip one edge of a piece of 1½×2" stock about 12" long. The Top View Full-Size Pattern for part F shows the profile. Refer to the Front View Full-Size Pattern, and trim the part to length, beveling the end.

3 Cut the lower ramp (G), lower guide (H), upper guide (I), upper ramp (J), and middle ramp (K) to the sizes shown. Round one end of the lower guide (H) and both ends of the others.

4 Now, fashion the three flippers (L) and the spinner (M).

To make them, plane a piece of ¾×3" stock about 12" long to ⅝" thick. Cut blanks from the stock for the flippers and spinner, and adhere the patterns to them.

Drill and countersink a hole through each part where shown. The holes must run straight through the flippers and spinner, so drill them with a drill press. Scrollsaw each piece to shape.

5 Adhere the pattern for the delivery ramp (N) to a ¾×4½×8½" blank. (We positioned the pattern to place the long upper surface of the ramp along the straight edge of the stock.) Bandsaw the part slightly outside the line. Sand to the line.

6 Cut out the loop (O), following a similar procedure. Sand all parts.

Prepare for launching

1 Make the loading block (P) and firing block (Q).

Start by ripping two 1"-wide blanks from the remaining ⅝"-thick stock. Crosscut one piece to the length shown for each part. Drill a ¼" hole in each where shown on the Full-Size drawing.

Trace the notch outline onto part P, and scrollsaw it. Sand the depression in one end of part Q. Glue a 1½" length of ¼" dowel rod into the hole in each part. Sand the blocks to slide freely in the channels.

2 Cut the two spring leaves (R, S) to the dimensions shown.

Here's an easy way to make them. Start with a piece of oak measuring ¾×3×9½". Position your tablesaw's fence 2 13/16" from the blade (assuming a ⅛"-wide blade kerf), and rip a 1/16" strip on the outside of the blade, as shown *below*. Move the fence to 2⅝" from the blade, and rip another strip.

Trim one strip to 7⅞". Drill a 5/32" hole through the center of each.

3 Cut the spring support (T) and spring block (U) to the sizes shown. Drill a 3/32" pilot hole ⅞" deep in the center of one end of part T. Radius that end of the piece to the contour shown on the Full-Size drawing. Drill a 5/32" hole through the center of part U.

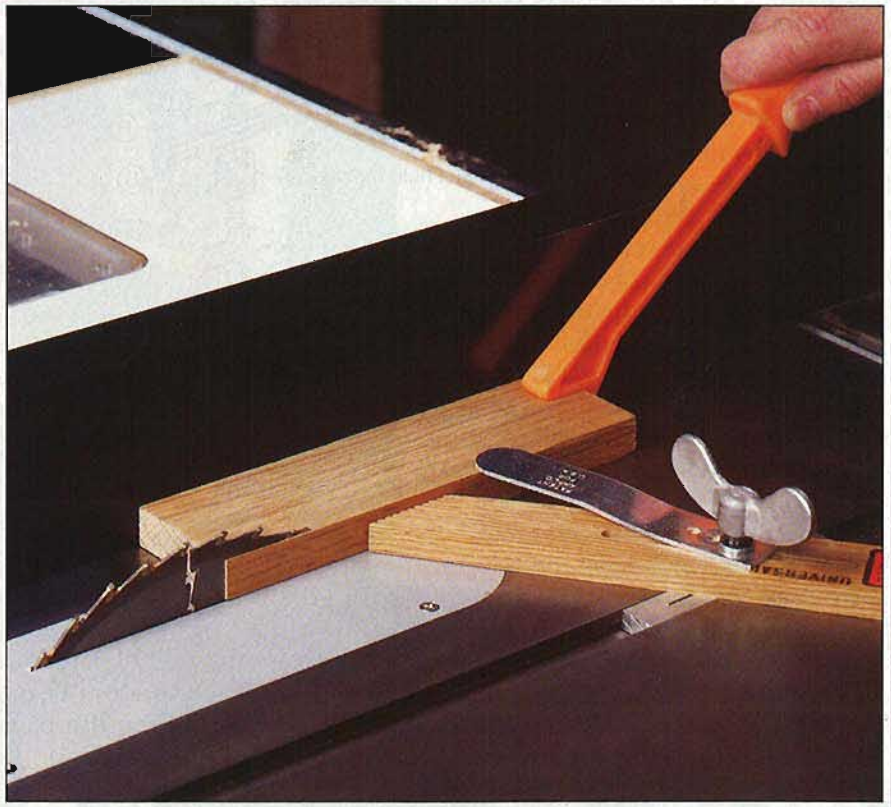
4 Center the spring support (T) from side to side on the base so it will sit about 1/16" in front of the acrylic. Drill 3/32" holes 1¾" deep up through the base into the support. Enlarge the holes through the base to 5/32", and countersink them on the bottom.

5 Make the delivery cup (V).

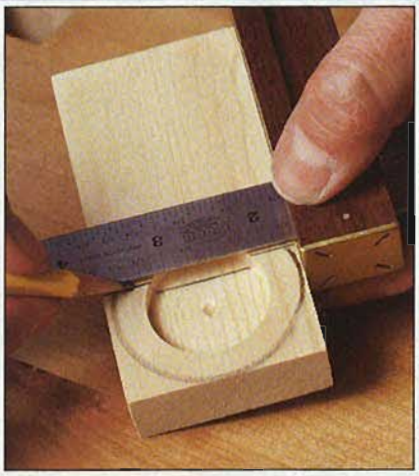
Here's how to do that. With a compass, draw a 1⅞"-diameter circle on a piece of ¾"-thick stock about 2×4". Draw the circle tangent to one end of the stock, as shown by the pencil circle in the photo on the *opposite page*.

At the center of the circle, bore a 1¼" hole ¼" deep. A Forstner bit chucked in a drill press will do the job easily.

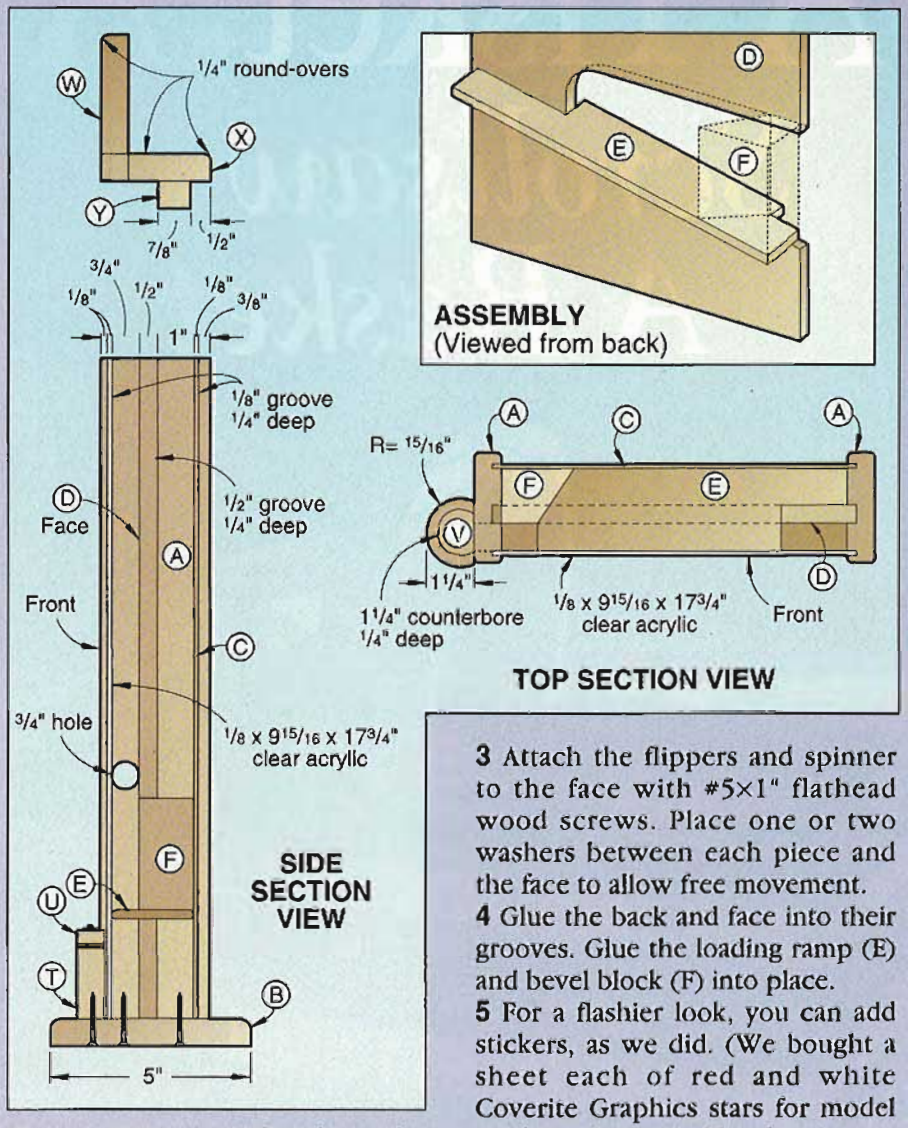
Using a try square, draw a cutting line straight across the stock, 1¼" from the end, shown *opposite page*. (You could draw it on the back, if that is easier.) Bandsaw or scrollsaw the part to shape. Sand the flat face true. Sand all parts.



Rip the 1/16"-thick spring leaves (R, S) on the outside of the blade for safety. Install a zero-clearance table insert when sawing the thin pieces.



Lay out the delivery cup (V) on over-length stock for more convenience.



Top it off and paint it up

1 Cut the arch front (W) to the size shown. Transfer the arch outline from the Full-Size Half Pattern to the workpiece. Bandsaw or scrollsaw the part. Sand the sawn edge as necessary. Rout a ¼" round-over along the front of the arch. Sand a similar round-over on the ends.

2 Cut the top (X) to size. Rout a ¼" round-over along both ends and the back on the upper face.

3 Cut the plug (Y) to size. Sand parts W, X, and Y.

4 Glue the arch front (W) to the front edge of the top (X). Keep the bottom surface and both ends flush. Clamp the assembly.

5 Glue the plug (Y) to the bottom of the arch front/top assembly where shown. Center the plug from side to side, and clamp.

6 Paint the side/base assembly and the top assembly. (We primed the wood, then sprayed on several coats of Krylon no. 1910 True Blue, sanding between coats.)

7 Mask gluing areas on the face (D) for the guides and ramps (E, G, H, I, J, K, and N) and loop (O). Then, prime the back (C) and face (D), and paint them. (We sprayed on several coats of Krylon no. 2103 American Beauty Red, sanding between them.)

8 Paint the remaining parts, except the spring leaves, gloss white. (Don't apply *any* finish to the spring leaves.) Leave gluing surfaces unpainted.

Finally! Time to play pinball

1 Slide the back (C) and face (D) into their grooves in the sides without gluing them. Glue parts G, H, I, J, K, N, and O to the face where shown. (We laid out the parts without glue first.)

2 Mark where the top of the delivery ramp (N) meets the left side (A). Measure 5/16" up from there, and center a mark between the front and middle grooves. Transfer that point to the outer face of the side, and drill a ¾" hole through the side. Sand the hole, and touch up the paint with a brush.

3 Attach the flippers and spinner to the face with #5×1" flathead wood screws. Place one or two washers between each piece and the face to allow free movement.

4 Glue the back and face into their grooves. Glue the loading ramp (E) and bevel block (F) into place.

5 For a flashier look, you can add stickers, as we did. (We bought a sheet each of red and white Coverite Graphics stars for model airplanes from a hobby shop.)

6 Put the loading block (P) and firing block (Q) in place, and slide the acrylic front into its grooves.

7 Screw the spring support (T) to the base. Slide the spring leaves (R and S) under the dowels on the loading and firing blocks. Center the springs on the support, and secure them with a screw through the spring block (U).

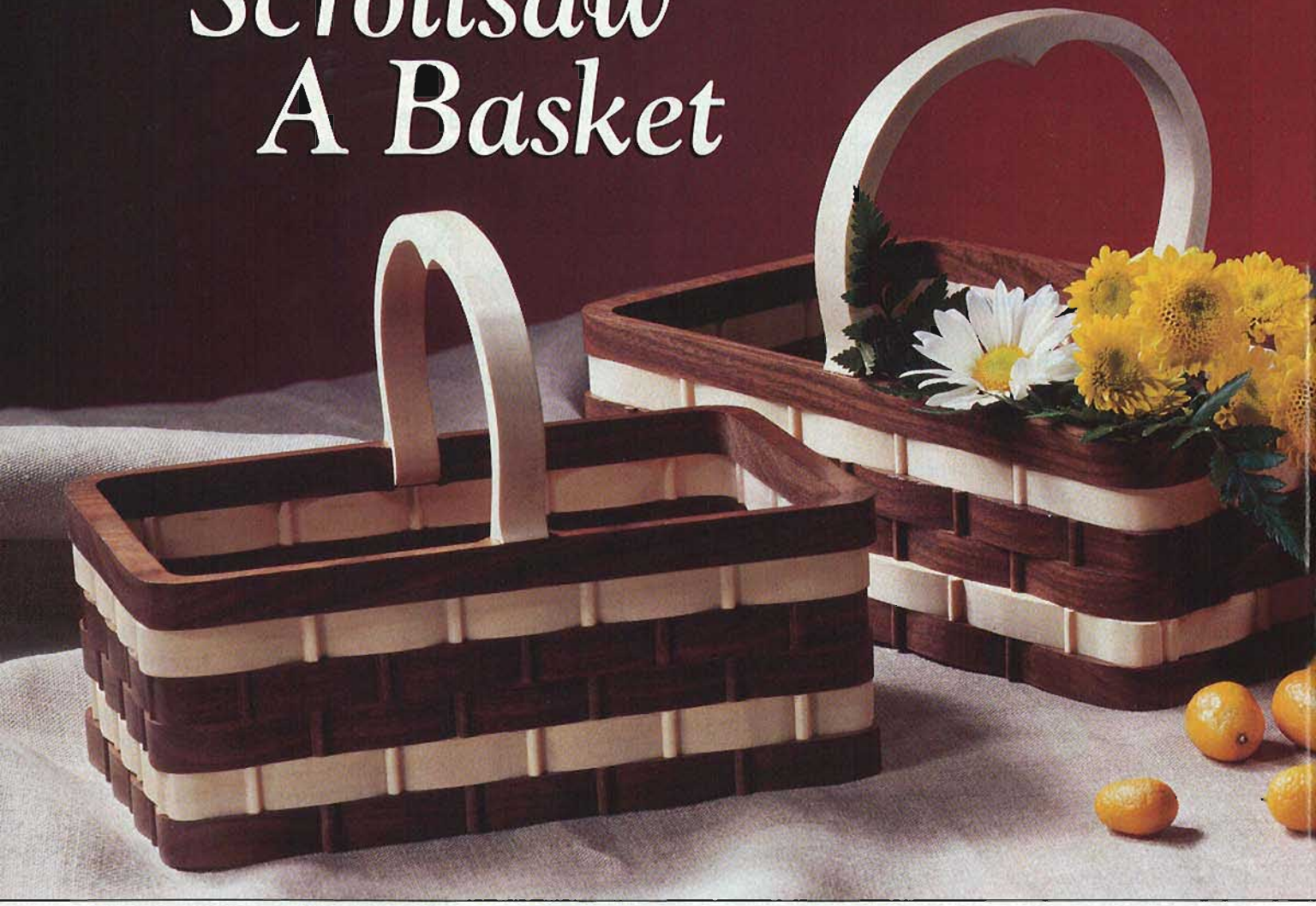
8 Glue the delivery cup (V) to the side, just below the hole. Scrape away some paint for better gluing.

9 Finally, fill the machine with gum balls. (We bought bags of them at a Walgreen's drugstore.) Pour them into the top, between the face and back panel. Don't overfill—a few dozen is enough.

Project Design: David Ashe Illustrations: Roxanne LeMoine; Lorna Johnson Photographs: Marty Baldwin; Hetherington Photography

A Tisket, A Tasket

Scrollsaw A Basket



1 Using the Full-Size Half Patterns in the *WOOD PATTERNS*® insert, make patterns for the top, parts B, D, and F, and parts C and E. Make two copies of the Parts B, D, and F pattern. Note that each one shows nested parts for baskets of three different sizes. Cut apart the three pieces on one copy of the parts B, D, and F pattern to make individual patterns for the bottoms (F). Photocopy the handle patterns.

2 To make the set of three baskets, cut blanks A-G to the sizes shown in the Bill of Materials. Cut bottom blanks (F) to all three sizes shown. (A ½×6½×55" piece of walnut and a ½×6½×27" piece of maple will yield all the blanks.)

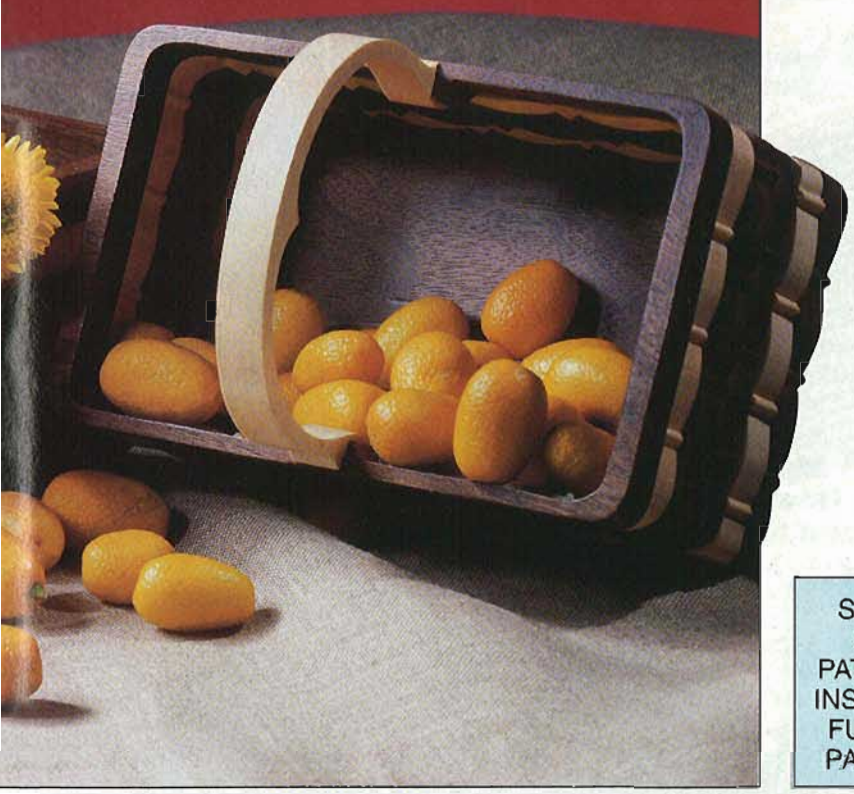
3 Temporarily laminate the part B and D blanks with double-faced tape. Do the same with the two part C and E blanks.

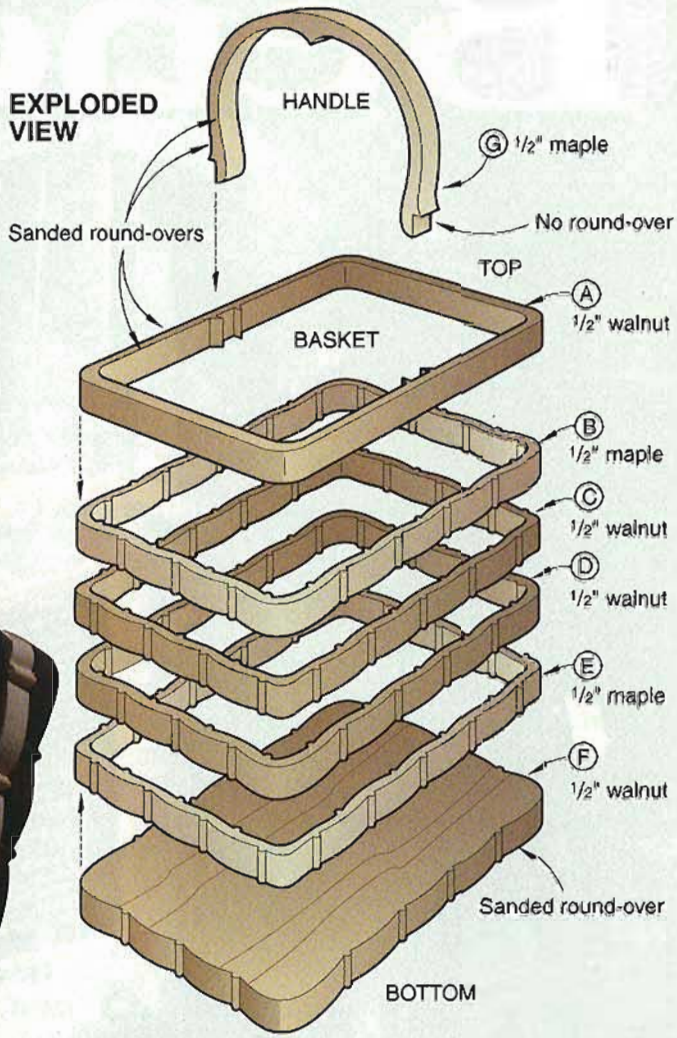
4 Adhere each pattern to its blank or stack of blanks, using rubber cement or spray adhesive. With spray adhesive, follow the label instructions for temporary bonding.

5 Drill blade start holes where indicated. Starting with the Top-patterned piece (A), insert the blade through the innermost hole. Scrollsaw the inside of the smallest top piece. (A #7 blade, .045×.018" with 11½-14 teeth per inch, will handle the cutting.)

Then, put the blade through the next hole outward. Saw around the outside line of the smallest top piece. Set the piece aside, then cut around the inside of the middle-size top piece. As before,

These baskets may look woven, but they aren't. Instead, they're stacked scrollsawn sections that are so easy to cut that even a novice will achieve great results.





SEE THE *WOOD* PATTERNS® INSERT FOR FULL-SIZE PATTERNS

cut around the outer line of that piece, then cut out the inside and outside of the largest top.

6 Following a similar strategy, cut out the stacked basket sides, parts B and D and C and E.

7 Scrollsaw the basket bottoms (F) and handles (G).

8 Sand all parts as necessary. Sand slight round-overs on the handle, top, and bottom where indicated.

9 Referring to the Exploded View drawing, glue parts B, C, D, and E to the bottom (F). Glue the basket top (A) to the top of the stack. Clamp the glued assembly between two pieces of scrapwood.

10 After the glue dries, unclamp the basket. Apply glue to the handle slots in the top (A), and slide the handle (G) into the slots. Clamp with spring clamps.

11 To finish the baskets, spray on a coat of semigloss polyurethane or other clear finish.

Project Design: John Nelson for Scroller Ltd.
Illustrations: Kim Downing; Lorna Johnson
Photograph: Hetherington Photography

Bill of Materials

Part	Blank Size T	W	L	Matl.	Qty.
A* top	½"	6½"	9¾"	W	1
B* side 1	½"	6½"	9¾"	M	1
C* side 2	½"	6½"	9¾"	W	1
D* side 3	½"	6½"	9¾"	W	1
E* side 4	½"	6½"	9¾"	M	1
F bottom (lg.)	½"	6½"	9¾"	W	1
F bottom (med.)	½"	5¼"	7¾"	W	1
F bottom (sm.)	½"	4¼"	6½"	W	1
G** handle	½"	5"	6½"	M	1

*Blank size shown yields tops and sides for all three baskets or the large one built separately. To make the medium or small basket only, cut top and side blanks to the size shown for the medium or small bottom (F).

**Blank size shown yields all three handles or large one only. For medium or small handle, measure pattern to determine blank size.

Materials Key: M–maple, W–walnut

Benchtop

They make easy work of building strong joints

If you include mortise-and-tenon joinery in your projects—or would if you could find a fast and easy way to make the mortises—you may want to consider buying a mortiser. To help you decide on a model, we tested eight affordable benchtop units. All of them will cut a mortise, but we found distinct differences in their ease of use and effectiveness.

Mortisers

Fast Facts

- You can buy a ½-hp mortiser that makes mortises up to ½" wide for less than $300. Such a mortiser amply handles the needs of most home woodworkers.
- Depending on how many mortises you make, a drill-press mortising attachment may make more sense for you. You'll spend less money and still get clean mortises.
- Regardless of the mortiser you choose, the key to clean and low-effort mortises is an accessory: the hollow chisel and bit set used to make the cut. We'll tell you which sets make the grade—and which ones don't.

A few words about our test

We concentrated this review on six benchtop mortisers costing less than $300. These units have ½-hp motors and handle chisels up to ½" wide. They accommodate stock up to 2½-3½" thick (this varies depending on the model) under their hold-downs. Some models will mortise to the center of 9"-wide workpieces—others reach only to the center of 6½"-wide stock.

For those of you who need something with more power, we also tested a ¾-hp model that powers chisels up to ¾" wide, and a 1-hp model that accommodates 1" chisels.

The mortisers made holes in pine with ease, so we pushed them to their limits by cutting mortises up to 1½" deep in white oak and hard maple. We cut mortises into the edge of ¾" stock to determine how well each machine's fence and hold-down work with thin material. And, to see how well these components handle thick material, we mortised 2½"-square stock.

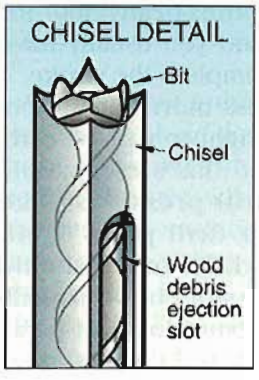
To put the machines on a level playing field, we tested all of them with ½" Clico-brand chisels and bits. We also conducted a series of cutting tests with the other brands of chisel/bit sets sold by the various mortiser manufacturers. Among other things, these cutting tests revealed much about the relative hardness of the chisels and bits (turn the page to see "Chisel/bit sets: The key components in mortisers").

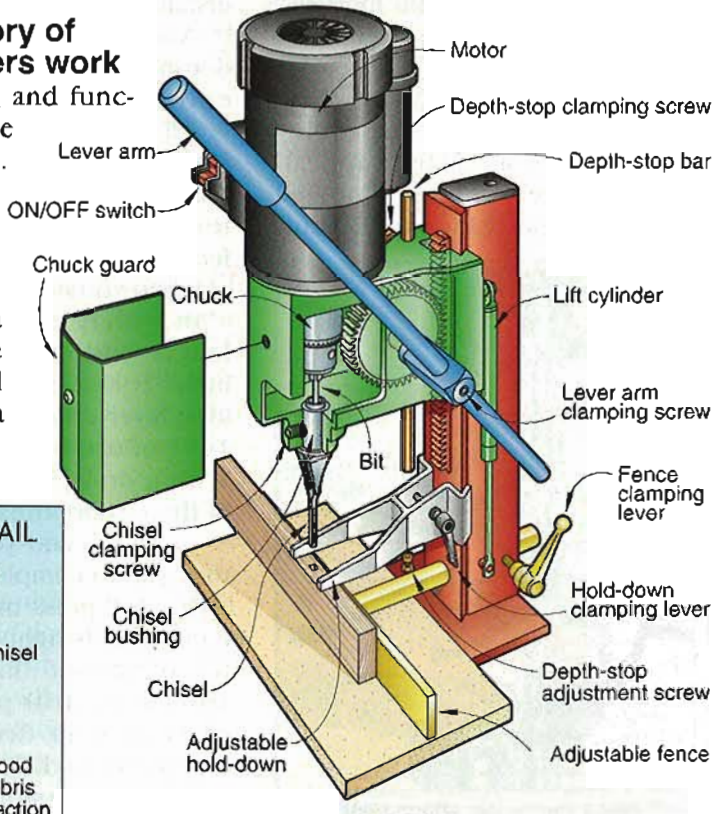
The hole story of how mortisers work

Mortisers look and function much like drill presses. Both have a rotating chuck that holds a drill bit that plunges into a workpiece when you pull down on a lever arm.

But with a mortiser, the bit spins inside a hollow chisel that does not rotate. As the bit hogs away mortise material, the sharp edges of the chisel shear off the flat mortise walls. The debris spews out the open sides of the chisel.

Continued





ANATOMY OF A HOLLOW-CHISEL MORTISER

Benchtop Mortisers

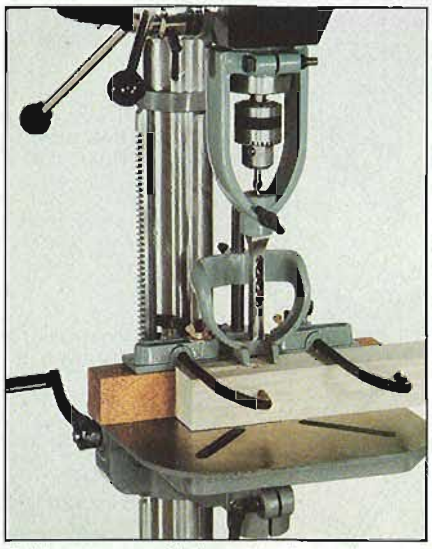
Because of the chisel's shearing action, you exert considerable downward pressure on the lever (1"-wide chisels may take all the strength you can muster). A depth-stop bar controls how deep the bit and chisel cut, and a fence assures that each successive cut falls on a line parallel to the edge of the workpiece.

When you raise the lever to withdraw the bit, the chisel tends to grab the walls of the mortise, especially if the workpiece lifts or twists. A sturdy, properly adjusted hold-down prevents this.

Comparing these machines to other mortising options

If you cut a mortise-and-tenon joint only once in a blue moon, by all means, don't plunk down upwards of $200 for one of these machines. (A good set of chisels and bits could double your investment.) Rather, stick to your trusty drill press and conventional drill bits for hogging out the mortises, and hand chisels for cleaning them up.

If neither the idea of hand chopping with chisels, nor spending $200-plus for a mortiser appeals to you, there's one more option. Drill-press mortising attachments like the one shown *below left* cost surprisingly little—$25 to $40 for most Taiwanese-made versions. (Again, a good set of chisels/bits will double or triple your total investment.) You'll save some money going this route, and in our tests the mortising attachments were just as effective as dedicated mortisers in making clean, accurate mortises.



Drill-press mortising attachments cost less than dedicated mortisers, but you'll spend more time setting them up.

Also, drill presses afford you more workpiece capacity because you can mortise to the center of wider pieces (the largest machine in our test mortises to the center of a 9"-wide piece, a 14" drill press drills to the center of 14"-wide glue-ups). And, because the table of a drill press tilts, you can cut angled mortises.

Despite those advantages, a dedicated mortiser still makes the most sense if speed and ease sit atop your priority list. Why? It's a snap to set up a mortiser, but you'll spend about 10 minutes installing a mortising attachment.

Although installation time doesn't matter if you dedicate an extra drill press to mortising, you'll still spend more time adjusting the fence on a drill-press attachment. That's because these fences—unlike a mortiser's fence—don't stay square to a chisel when you move them.

And, every cutting plunge takes longer with a drill-press attachment. For example, you rotate the long lever arm on a mortiser only 140° of arc for 4" of bit travel. With a drill press you rotate one of three short arms nearly 360° for 3" of travel, and you usually have to regrip to complete the stroke.

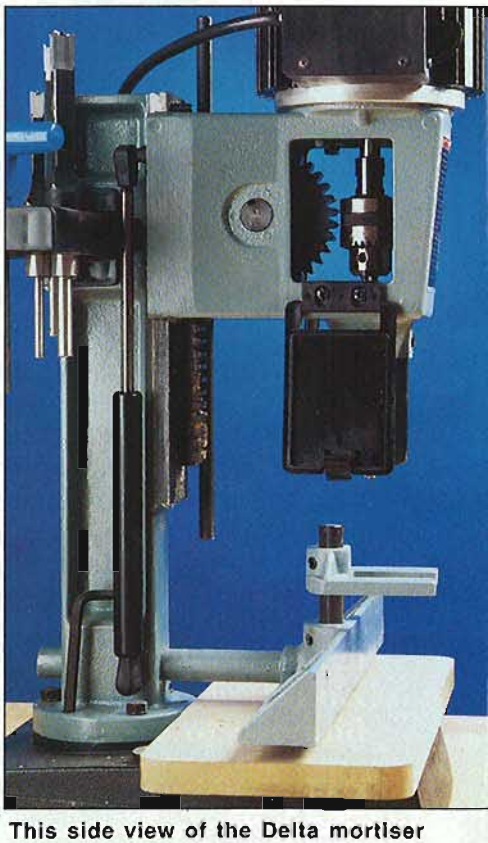
If a drill-press mortising attachment sounds right to you, be careful to buy one that's compatible with your drill press. Its yoke must fit your drill press' quill diameter. And, its fence should mount to the slots in your drill-press table—some slots run parallel front to rear, and some radiate.

How our test units compare in key areas

• ***Hold-downs.*** This critical component must be rock-solid. If it flexes upward when you withdraw the chisel from the workpiece, the chisel will bind against the mortise. Besides the frustration this causes, such binding can pull the chisel loose and damage the cutting edges of the chisel or drill bit.

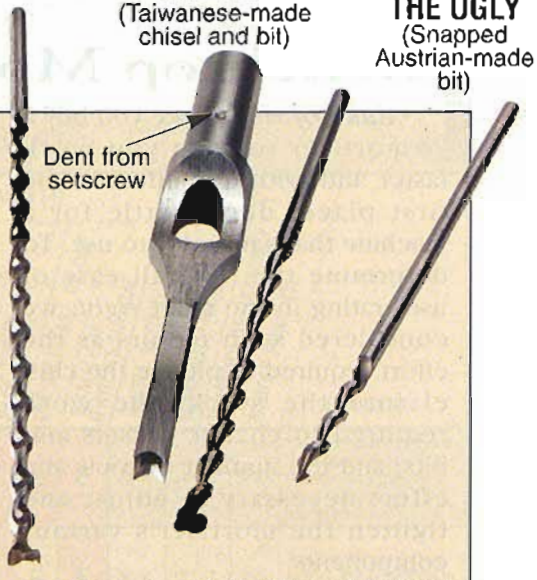
As you can see in the chart at the end of this article, the Multico mortisers earned "excellent" ratings for hold-down effectiveness. They showed almost no flex because of their stiff, I-beam-like construction, and their solid connection to the machine's post (see the anatomy illustration based on a Multico machine on the *previous page*).

The hold-downs on the other mortisers attach to the fences as shown *below.* Although this



This side view of the Delta mortiser shows a fence-mounted hold-down and a chuck with access from two sides.

Chisel/bit sets: The key components in mortisers



No single feature of your mortiser will affect the quality of your mortises, and your level of enjoyment, as much as the chisel/bit set. With the standard ¼", ⅜", and ½" sets available for our tested machines, we cut mortises up to 1½" deep. We tested one brand, Multico Premium, that has extra long chisels and bits that permit mortises up to 4" deep in the ⅜" and ½" sizes. You can cut mortises 3¼" deep with standard ¾" and 1" sets.

As you can see in the chart *below*, the chisel/bit sets included in our testing ranged greatly in quality and price, costing as little as $10, and as much as $68, for a single ⅜" set.

Why such a wide range? In our tests we found that the expensive bits held up much better than their low-cost counterparts. As shown *above right*, the low-cost Taiwanese chisels had shank barrels made of thin, soft steel that dented easily under the force of the setscrew that holds the chisel square to the workpiece. The cutting edge of the chisel, although sharp from the factory, dulled after only a few mortises.

The problems of low-cost bits became especially evident in the ¼" size. During deep cuts, when bits jam from time to time, the Taiwanese bits would actually distort—the flutes "unraveled," causing the bits to enlarge in diameter and not fit properly into the chisel. The Austrian-made ¼" bit shown in the photo was made of harder steel, but snapped when jammed (the other sizes of Austrian bits performed well).

The Clico ¼" bits, also made of hard steel, did not snap because they were the only two-flute bits in that size. Two-flute bits are inherently stronger because they have more steel mass in the flutes. Single-flute bits have precious little steel holding them together at their thinnest points.

Because the more-expensive bits are made from harder steels, you can expect them to go longer between resharpenings. And, you can buy accessory resharpening kits (about $70–$80) for the two higher-cost sets in our test—Clico and Multico Premium. These come in handy because few professional sharpeners have the necessary equipment to do the work. These sharpening kits are not compatible with many Far East chisels, which you may have to throw out when they dull.

In the chart we rate the various sets for "cut quality" and "cutting ease." The sets that scored higher in these areas had sharper factory-ground cutting edges on the chisels and bits. A sharp chisel will cleanly shear a mortise wall with minimal effort from you. A dull or incorrectly ground chisel will tear the wood fibers and make you bear down heavily on the mortiser's lever arm.

Our advice: If you make a lot of mortises, invest in Clico chisel/bit sets. If two or three Clico sets stretch your pocketbook too far, buy just the Clico ¼" set simply because of the tendency of bits of any other brand in this size to self-destruct. The Delta sets, thanks to the hardness of their steel, represent the best buy of the lower-cost products. And, regardless of brand, check the bits for straightness. We came across several bent bits, especially in the ¼" size.

AN UP-CLOSE COMPARISON OF ⅜" CHISEL/BIT SETS

MANUFACTURER/ IMPORTER	NUMBER OF DRILL BIT FLUTES	PERFORMANCE (1) CUT QUALITY	CUTTING EASE	BIT QUALITY	COUNTRY OF MANUFACTURE (2)	PRICE OF A ⅜" SET (3)
CLICO	2	E	G	E	E	$55
DELTA	1	E	E	G	A	17
GRIZZLY	1	G	E	F	C/T	16
HARBOR FREIGHT	1	F	G	P	C	13
MULTICO (WHITE BOX)	1	G	E	F	T	*
MULTICO PREMIUM (GREEN BOX)	1	E	E	E	J	68**
WOODTEK	1	G	E	F	T	17

NOTES:

1. E Excellent, G Good, F Fair, P Poor
2. (A) Austria, (C) China, (E) England, (J) Japan, (T) Taiwan, (C/T) Grizzly ¼" set made in China; ⅜" and ½" sets made in Taiwan.
3. Mail order prices. Shipping charges not included. Other sizes available.
   (*) These sets available when supplied with Multico mortisers. Not available for purchase separately.
   (**) Require a special 13/16" chisel bushing. Chisels are extra long.

arrangement worked adequately on all but the Harbor Freight mortiser, slight hold-down flexing occasionally led to binding. The Harbor Freight hold-down was ineffective because we found it impossible to keep the hold-down or the fence from sliding upward in normal use.

Although not quite on a par with the Multico hold-downs, the Delta hold-down was the best of the rest in the test. Like the Multico, the bottom surface of the Delta hold-down (that contacts the workpiece) is flat and parallel to the table. This helps keep the workpiece firmly on the table.

Continued

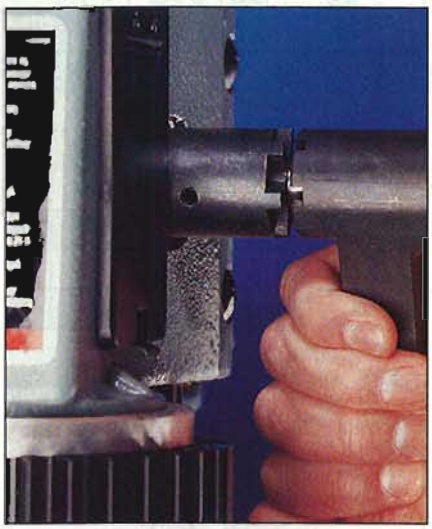
Benchtop Mortisers

• ***Ease of use.*** Since you buy a mortiser to help you work faster and with less effort in the first place, don't settle for a machine that's not easy to use. To determine the "overall ease of use" rating in the chart *right*, we considered such factors as the effort required to plunge the chisel into the stock, the work required to change chisels and bits, and the number of tools and effort necessary to adjust and tighten the mortiser's various components.

To ease the effort of plunging the chisel, these machines have long lever arms ranging from 16½" to 23" long. Among the ½-hp units, the 19" Multico arms were the longest. This extra leverage contributed to their having the easiest plunge.

All of the machines have some means by which you adjust the starting point of the lever arm's arc. Depending on the height of the mortiser, your own stature, and the depth of the cut, you need to adjust the arc of the lever arm for comfortable operation.

The Delta arm proved easiest to adjust. As shown *below*, it has a spring-loaded pivot point that adjusts to any of six positions instantly by pulling out on the pivot and letting it go at the correct position. All of the other arms require a wrench or screwdriver for adjustment. The Harbor Freight mortiser gives you only two possible arm positions; the others give you four or six (see chart for specifics).



You can quickly adjust the spring-loaded Delta lever arm by pulling it out, turning it, and releasing.

If you frequently change chisels and bits, take a look at the "chisel changing ease" and "chuck access" columns in the chart. The Delta proved tops in these areas because, like the Multicos, you can quickly access the chuck from two sides. (The Harbor Freight is open on two sides, but smaller openings inhibit access.) And, like the Harbor Freight, the Delta comes with a long chuck key that helps prevent you from skinning your knuckles on the housing that surrounds the chuck.

Mortisers have plenty of adjustments, so we appreciate that the Delta and Multico units have onboard storage for the chuck key and adjustment wrench. This may seem like a small point, but it sure cuts down on chuck key and wrench searches. The Delta also has onboard chisel/bit set storage.

• ***Chucks.*** The English-made Multico units have German-made Rohm-brand chucks that we prefer over the Taiwanese-made chucks on the other units. The Rohm chucks tighten and release in about a ¼ turn, whereas the other chucks require up to a ¾ turn. Other than just the obvious time savings, the ¼ turn saves on skinned knuckles in the tight quarters around the chuck.

• ***Speed.*** All of the tested motors turn the chuck at or around 3450 rpm except for the Delta, which goes half as fast at 1725 rpm. In our trials we found pros and cons to both speeds.

The 3450 rpm units had better debris ejection from the chisel on most species. Chisels stayed cooler with the Delta, but we had to slow its feed rate compared to the other units. Because of the extra heat, the chisels on the 3450-rpm machines tended to turn blue and scorch the walls of the mortises.

The moment of truth: where to put your money

Among the ½-hp mortisers priced near or under $300, two units were clearly better than their

A FEW MORE MORTISER MORSELS

BRAND	MODEL	MOTOR: HORSEPOWER	MOTOR: AMPERAGE	MOTOR: SPEED (RPM)	CAPACITY (INCHES): MAX. SPINDLE TRAVEL	CAPACITY (INCHES): MAX. DEPTH UNDER HOLD-DOWN (1)	CAPACITY (INCHES): MAX. FENCE-TO-CHISEL DISTANCE	CAPACITY (INCHES): CHISEL SHANK DIAMETERS ACCEPTED BY MACHINE (2)	CAPACITY (INCHES): MAX. RECOMMENDED CHISEL WIDTH	CAPACITY (INCHES): MIN. STOCK HEIGHT UNDER HOLD-DOWN (3)	LEVER ARM: LENGTH (INCHES)	LEVER ARM: NUMBER OF POSITIONS	PERFORMANCE (4): CHISEL CHANGING EASE	PERFORMANCE (4): CHUCK ACCESS	PERFORMANCE (4): DEPTH STOP EASE OF USE AND EFFECTIVENESS (5)	PERFORMANCE (4): HOLD-DOWN EFFECTIVENESS (6)	PERFORMANCE (4): HOLD-DOWN EASE OF USE	PERFORMANCE (4): OVERALL EASE OF USE	PERFORMANCE (4): QUALITY OF OWNER'S MANUAL	CHISEL WIDTHS INCLUDED (INCHES)	WARRANTY (MONTHS)	COUNTRY OF ASSEMBLY (7)	STREET PRICE (8)	COMMENTS
DELTA	14-650	½	5	1725	4¼	3½	3¼	⅝	½	2	16¾	6	E	E	E	G	E	E	E	None	24	T	$250	Sturdier construction and extra features make this a better value than the other Taiwanese-made mortisers.
GRIZZLY	G3183	½	6	3450	4½	3	3½	⅝, ¾	½	1⅝	16½	6	G	F	E	G	E	G	E	None	12	T	225*	A respectable performer overall. Nearly identical to the Woodtek machine.
HARBOR FREIGHT	35570	½	2.3	3598	4½	2½	3¼	¾	½	1⅜	17¼	2	F	G	P	P	P	P	F	¼, ⅜, ½	1	C	170**	Lowest priced machine in test. Performance leaves much to be desired.
MULTICO	PM10	½	4.8	3450	4¼	2¾	4½	⅝, ¾	½	1⅝	19	4	E	E	E	E	G	E	G	None	12	E	299*	The original benchtop mortiser. The best-made machine in its class.
	PM12	½	5.2	3450	4¼	2¾	4½	⅝, ¾	½	1⅝	19	4	E	E	E	E	G	E	G	½	12	E	459*	Like the PM10 but with continuous-duty motor, magnetic switch, and comes with three chisel/bit sets. Also $160 more.
	PM16SP	¾	7	3450	4¼	2¾	4½	⅝, ¾	¾	1⅝	19	4	E	E	E	E	G	E	G	¼, ⅜, ½	12	E	639*	Well-made like other Multicos. Handles chisels up to ¾" wide. Pricey. Comes with drill conversion kit.
WOODTEK	876-775	½	6	3450	4½	3	3½	⅝, ¾*	½	1⅝	16½	6	G	F	E	G	E	G	G	None	12	T	240*	A respectable performer overall. Nearly identical to the Grizzly machine.
	900-881	1	12	3450	5	4	3¾	⅝, ¾, 1⅛	1	1⅝	23	4	G	F	E	G	E	G	G	None	12	T	390*	Lots of power for the money. Handles chisels up to 1" wide.

NOTES:

1. Measured with hold-down in recommended position. You can gain more height by turning the hold-downs upside down, and by reversing column on base.
2. (*) Holds ¾" shanks if you purchase ¾" bushing from another supplier.
3. Lowest position of hold-down without spacer blocks under workpiece.
4. E Excellent; G Good; F Fair; P Poor
5. E Easy to set; holds securely; P Slips; not effective
6. E No deflection; G Minor deflection; P Major deflection
7. (C) China; (E) England; (T) Taiwan
8. Catalog prices at time of article's production. (*) Shipping cost additional. (**) Free shipping to 48 states.

Where to call for more information:

Delta
800/438-2486

Grizzly
800/523-4777

Harbor Freight
800/444-3353

Multico
(Available through Garrett Wade, call 800/221-2942; or Injecta Machinery, call 888/593-2453.)

Woodtek
(Available through Woodworker's Supply, call 800/645-9292.)

competitors: the Delta 14-650 and Multico PM10. Most woodworkers will be perfectly happy with the $250 Delta. For about $75 more ($299 plus $25 shipping) the Multico offers more-refined construction and a stouter hold-down.

Multico mortisers are available in the U.S. only from Garrett Wade (New York, N.Y.) and Injecta Machinery (Altadena, Calif.). Both outlets will ship your order—see phone numbers at the *bottom* of the chart *above*. You can buy the Delta from many local and mail order distributors.

Among the machines capable of making mortises more than ½" wide, the Woodtek 900-881 offers lots of value. Although not as well made as the Multico PM16SP, it has more power (making mortises up to 1" wide versus ¾" for the Multico), and costs about $250 less. If you opt for one of these large machines, be forewarned that you can't buy inexpensive chisel/bit sets in sizes over ½". Expect to pay $70–$160 per set in sizes from 9⁄16" to 1".

Written by Bill Krier Technical consultant: Dave Henderson Photographs: William Hopkins Illustration: Kim Downing

What a bunch of

Carvers take us back to the

Peering into the window at the Caricature Carvers of America's Full Moon Saloon, we spot the *Cowboy at the Bar* (foreground) and *The Cowboy's Sidekick* (behind), both by Pete LeClair. Far-fetched facial features give the improbable pair real-life personalities.

Caricatures always top woodcarving's "most fun" charts. On the respect scale, though, caricatures thud to the bottom. A talented, fun-loving group of carvers is aiming to change that.

Whether you're chuckling over Pete LeClair's *Cowboy at the Bar* and *The Cowboy's Sidekick*, through the window *above*, or hewing out some crazy character of your own, comical caricature carvings bring nothing but pleasure. So, it's anybody's guess why so many people—including lots of woodcarvers—hold caricature carvings in low regard.

It may be because the carvings violate so many rules of formal, realistic sculpture, with their ridiculously exaggerated poses and proportions, as in the figures on the *opposite page*.

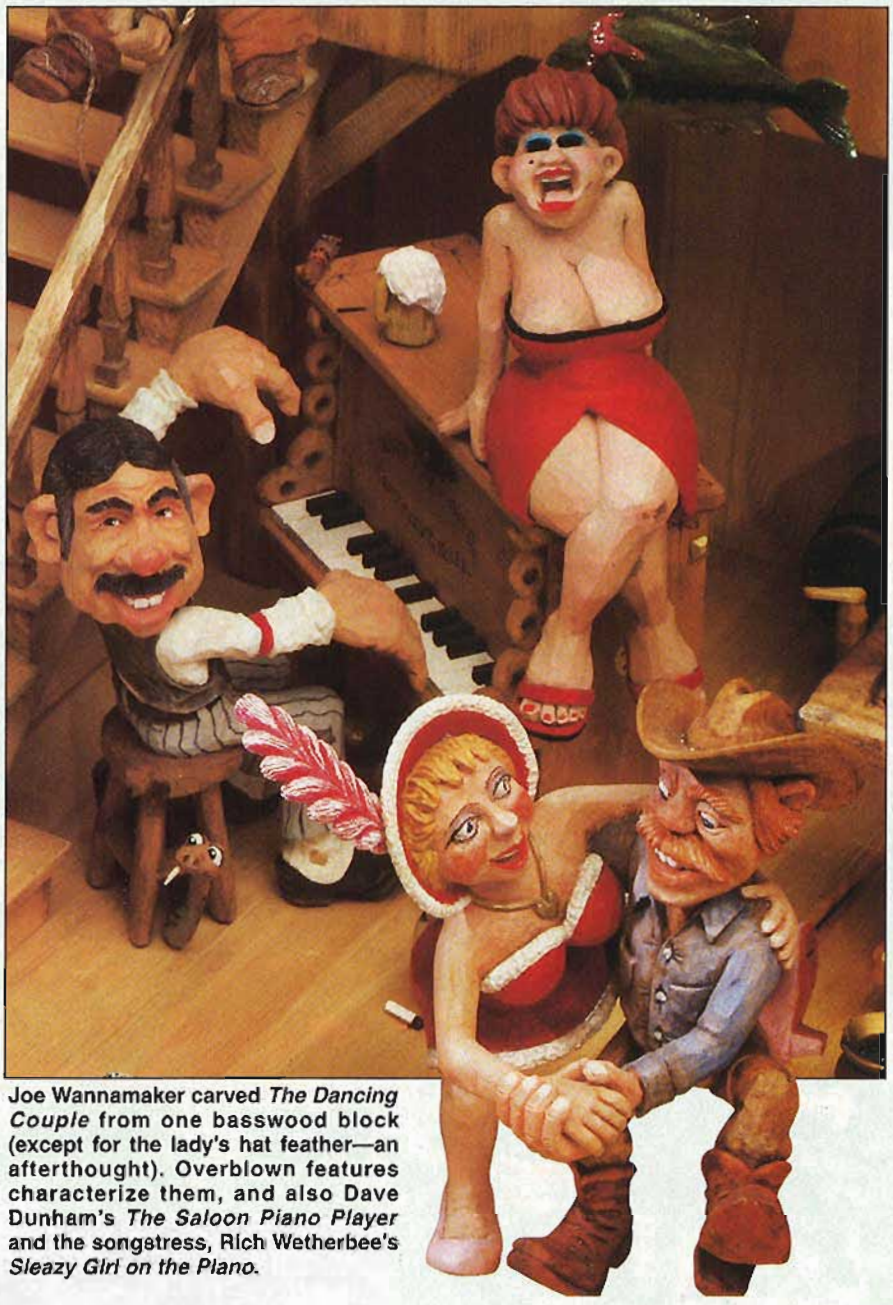
You'll certainly never meet people who look just like Joe Wannamaker's *The Dancing Couple*, Dave Dunham's *The Saloon Piano Player*, or Rich Wetherbee's *Sleazy Girl on the Piano*. But chances are, at least one of these figures reminds you in some way of some real person.

Too funny to take seriously?

The humor that makes these carved cartoons such fun sometimes works against them. People who believe art should be serious stuff think anything that tries so

CHARACTERS!

thrilling days of yesteryear



Joe Wannamaker carved *The Dancing Couple* from one basswood block (except for the lady's hat feather—an afterthought). Overblown features characterize them, and also Dave Dunham's *The Saloon Piano Player* and the songstress, Rich Wetherbee's *Sleazy Girl on the Piano.*

hard to make them smile can't be worthy of their respect.

Design and workmanship are often underappreciated because the carvings aren't true to life. Granted, some caricatures are crude. Yet, to do one well calls for the same kind of planning, design sense, and carving skill exhibited by "more serious" work. Beyond that, the caricaturist must invest additional effort into incorporating exaggerations that help tell a story or give a character personality, as in Marv Kaisersatt's *The Seated Cowboy*, on *page 66.*

CCA rides to the rescue

To help dispel the myth that a caricature carving is just a realistic figure that didn't turn out quite right, a group of leading woodcarving caricaturists banded together several years ago. Tagging themselves the Caricature Carvers of America (CCA), they set out to educate other carvers and the general public about the art and techniques of caricature carving. They hope to increase appreciation for caricatures, and to entice others to join in the fun.

In carrying out this goal, the group has in recent years mounted two tableaux—the Full Moon Saloon and the CCA Circus, both populated with figures that show woodcarving at its lighthearted best. The examples here came from the saloon. To see them in that setting, along with the rest of the saloon crowd, turn the page.

Buying Guide

Books. See the Full Moon Saloon and the CCA Circus in detail, with carvers' comments and figure patterns, in *Carving the Full Moon Saloon* and *Carving the Caricature Carvers of America Circus*, available at local bookstores, or at $19.95 each plus $2.50 postage and handling from Fox Chapel Publishing Co., 1970 Broad St., East Petersburg, PA 17520. Call 717/560-4703. When ordering from the publisher, mention *WOOD®* magazine to receive a free CCA Circus poster.

CCA on the Web

Learn more about the Caricature Carvers of America (including demonstration schedules) at http://www.cca-carvers.org

Continued

THE FULL

The Seated Cowboy, slouched down with his shoulders turned, head tilted, and legs crossed, emerged after two months of sketching, clay modeling, and carving by Marv Kaisersatt. Everything you see is carved from a single block of basswood.

The Caricature Carvers of America's first group effort, a 4'-long Old West saloon, includes pieces from 21 carvers. The figures and their carvers are: *The Hanging Drunk* by Keith Morrill on the coatrack *at left*, *The Rail Rider* by Randal Landen sliding down the banister, and crawling along the beam, *The Lamplighter* by Steven Prescott. Surveying the scene from the balcony are, *from left*, *The Old Coot* by Keith Morrill; *The Drunk* by Bob Travis; and *The Reverend and Mrs. Farkus* by Peter Ortel. *Hanging Harley* by Harley Schmitgen commands attention above the bar. *Flat on His Back* by Harold Enlow lies on the saloon floor *at left*, attended by Tom Wolfe's *Man's Best*

MOON SALOON

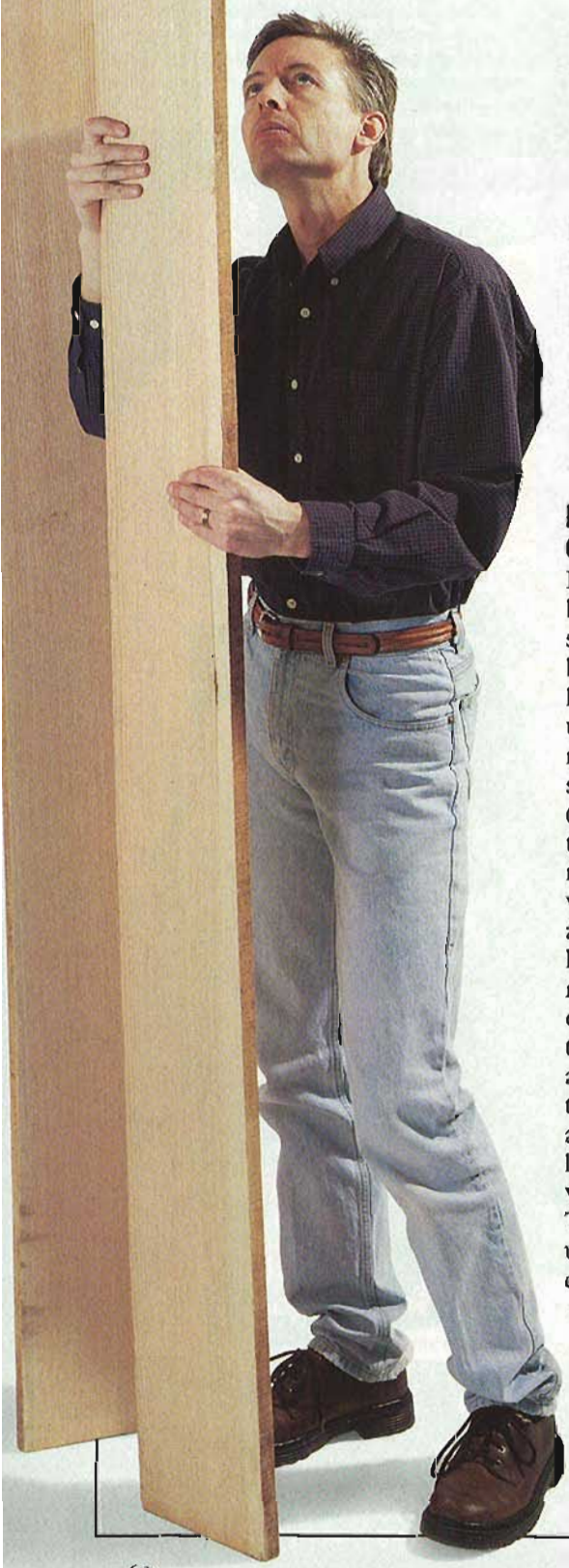
Friend. Behind them, Dave Dunham's *The Saloon Piano Player* pounds out a tune and Rich Wetherbee's *Sleazy Girl on the Piano* warbles while Joe Wannamaker's *The Dancing Couple* takes a whirl.

Marv Kaisersatt's *The Seated Cowboy* sips sarsaparilla or something as Doug Raines' *Sweet Betsy and Ike* head for the exit with different degrees of enthusiasm. *The Janitor* by Dave Rasmussen wrings his mop behind the card table, where *The Lady Card Shark* by Bob Travis seems to have garnered all the chips from an unnamed Travis figure and Garry Batte's *Card Player with a Bottle.* Tex Haase's *The Bartender* presides over the left end of the bar while at the other end Claude Bolton's *The Assistant Bartender* chats with *The Cowboy's Sidekick, Cowboy at the Bar* (both by Pete LeClair), and the suspiciously horsey-looking *Flirty Gertie* by Desiree Hajny. They seem to be keeping an eye on Joe Wannamaker's pooch, who simply doesn't believe there's *No Free Lunch.*

Amidst all the frivolity, *The Moose Hanger* by Dave Stetson struggles to finish up his interior decorating chores and *Sal and Igoo* (the local mortician, Sal Monilla, and his assistant) by Jack Price try to drum up orders for pre-need headstones. And if looks could kill (not to mention that hatchet), Claude Bolton's *Carrie Nation* would be making business for them.♠

Photographs: Courtesy of Fox Chapel Publishing Co. Written by Larry Johnston

You, too, can be a savvy HARDWOOD



Buying wood can be just as much fun as working it, if you're informed. The basics here will get you started.

Understanding hardwood grades

No two hardwood boards look alike. That's why each hardwood board is assigned a grade at the mill by a lumber grader. Each grade, *right*, is based on a percentage of yield in clear face cuttings as seen from the clearest side of the board.

Easy board foot Calculation

Hardwoods sell in grades by the board foot, a basic unit of measurement that equals a 1"-thick board that's 12" wide and 12" long. That's because hardwoods—unlike softwoods—aren't cut and milled as dressed, sized lumber in standard nominal dimensions (2×4, 1×6, 4×4, etc.) to only be cut to length for construction. Instead, mills saw hardwoods into random widths and lengths to best take advantage of the clear wood in a log. Hardwoods do come in nominal thicknesses, such as 1", 1¼", etc. (often referred to as four-quarter, five-quarter, and so on), that actually are a bit shy of the stated thickness. Therefore, you'll pay for a 1"-thick measurement but actually be getting about 1/16" less. Board widths aren't standardized. Typically, the dealer will "round up" to the next inch of width and charge you for it. To help you in estimating stock and cost for the projects you want to build, the chart *right* gives you the amount of board feet in a range of common hardwood dimensions you'll likely come across where you shop for wood.

GRADING TERMS

GRADE	CHARACTERISTICS
FAS (First and seconds)	The best grade. Boards 6" and wider, 8' and longer. Almost clear. Yields 83⅓ percent clear face cuttings 4" or wider by 5' or longer and 3" or wider by 7' or longer.
Selects	Boards 4" and wider, 6' and longer. One side is FAS, the other is No.1 Common. Yields 83⅓ percent clear face cuttings.
No. 1 Common	Boards are 3" and wider, 4' and longer. Yields 66⅔ percent clear face cuttings 4" or wider by 2' or longer and 3" or wider by 3' or longer.

BOARD FOOT CALCULATOR

1"-THICK LUMBER

WIDTH	LENGTH 6'	8'	10'	12'	14'	16'
3"	1.5	2	2.5	3	3.5	4
4"	2	2.66	3.33	4	4.66	5.33
6"	3	4	5	6	7	8
8"	4	5.33	6.66	8	9.33	10.66
10"	5	6.66	8.33	10	11.66	13.33
12"	6	8	10	12	14	16

1¼"-THICK LUMBER

WIDTH	LENGTH 6'	8'	10'	12'	14'	16'
4"	2.5	3.33	4.16	5	5.83	6.66
6"	3.75	5	6.25	7.5	8.75	10
8"	5	6.66	8.33	10	11.66	13.33
10"	6.25	8.33	10.41	12.5	14.58	16.66
12"	7.5	10	12.5	15	17.5	20

2"-THICK LUMBER

WIDTH	LENGTH 6'	8'	10'	12'	14'	16'
6"	6	8	10	12	14	16
8"	8	10.66	13.33	16	18.66	21.33
10"	10	13.33	16.66	20	23.33	26.66
12"	12	16	20	24	28	32

SHOPPER

A guide to wood, its uses, grades, and board feet

YOUR GUIDE TO COMMON WOODWORKING WOODS

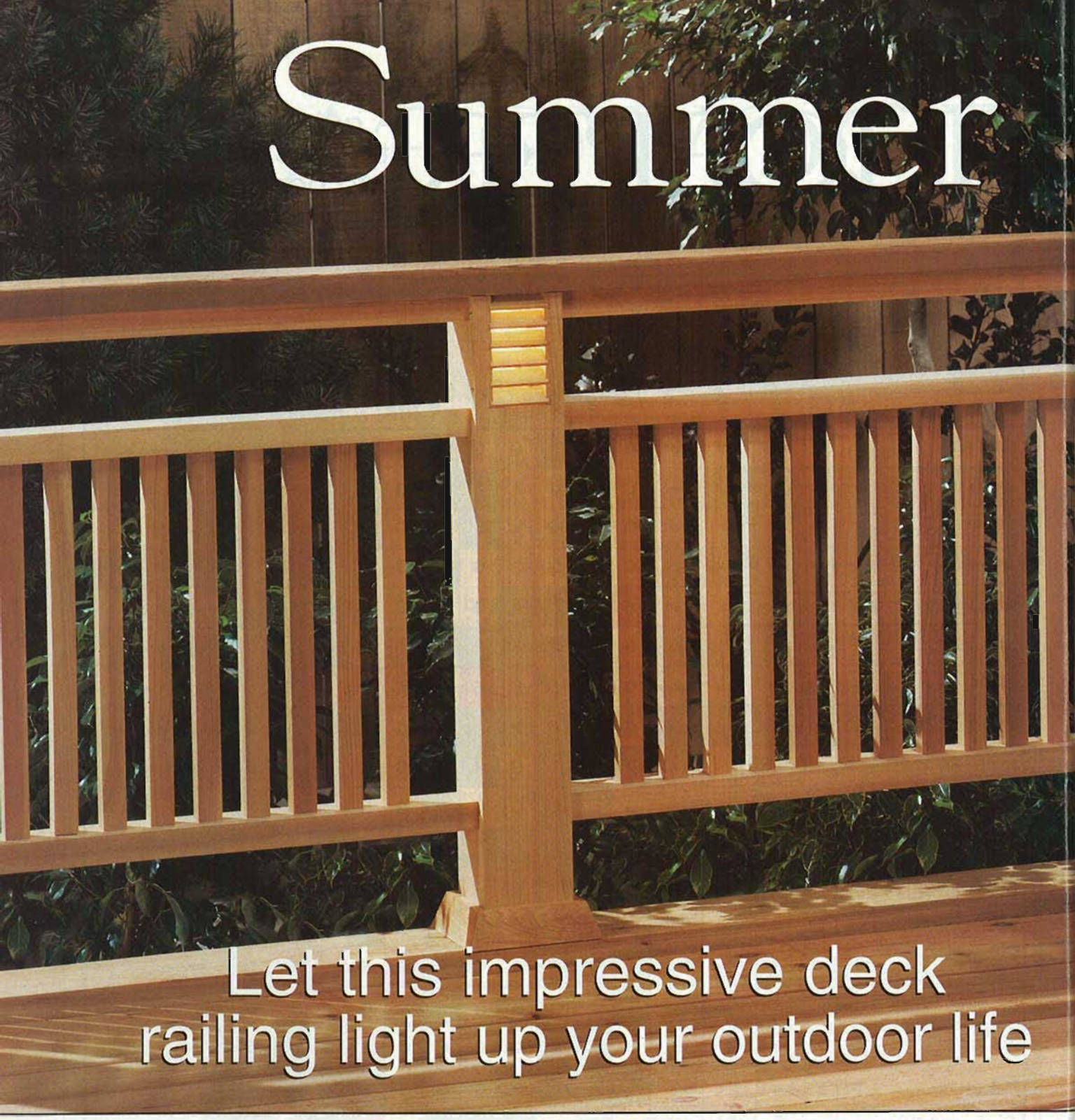
Puzzled by which wood to use for what? Much of the choice comes down to personal taste, then cost and availability. But until you know the qualities that help you choose one wood over another, the selection process can be confusing. Use the chart below to acquaint you with the woods in common usage.

WOOD SPECIES	PRICE (1)	AVAILABILITY (2)	HARDNESS	STRENGTH	WEIGHT	RATINGS (3) STABILITY	ROT RESISTANCE	SPLIT RESISTANCE	MACHINING QUALITY	TURNING	CARVING	PLANING/ JOINTING	GLUING	SANDING	STAINING	PAINTING	USE/COMMENTS
ALDER, RED	$$	R	Medium	Weak	Light	G	F	F	G	G	F	G	E	F	E	G	Cabinets, furniture, millwork
ASH, WHITE	$$	N	Hard	Strong	Heavy	G	F	G	E	F	P	G	G	E	G	F	Cabinets, furniture, doors
BASSWOOD	$$	N	Soft	Weak	Light	G	P	G	E	P	G	G	E	E	G	E	Best for carving
BIRCH, YELLOW	$$	R	Hard	Strong	Heavy	G	F	G	E	G	P	G	G	F	G	G	Cabinets, furniture, flooring
BUTTERNUT	$$$	R	Soft	Weak	Light	E	F	F	F	G	G	G	G	F	G	F	Carving, furniture
CEDAR, RED	$$	N	Soft	Weak	Light	G	E	P	F	P	P	F	G	P	F	G	Outdoor furniture, decks
CHERRY	$$$$	N	Hard	Strong	Medium	G	F	F	E	E	G	E	E	E	G	G	Fine furniture, cabinets
CYPRESS	$$	R	Medium	Medium	Medium	G	E	F	P	P	P	G	F	F	F	G	Outdoor furniture, decks
DOUGLAS FIR	$$	N	Medium	Strong	Medium	F	G	F	G	P	P	G	G	F	F	G	Strong utility wood
HICKORY	$$	R	Hard	Strong	Heavy	G	P	F	G	G	P	G	G	E	G	F	Chairs, tables, sporting goods
LAUAN (PHILIPPINE MAHOGANY)	$$	N	Medium	Medium	Medium	E	G	P	F	F	P	G	E	P	G	E	Furniture, boats
MAHOGANY	$$$$	N	Medium	Medium	Medium	E	G	P	E	E	G	G	E	G	E	E	Fine furniture, boats
MAPLE, SUGAR	$$$	N	Hard	Strong	Heavy	G	P	F	E	G	F	G	F	G	G	G	Durable for hard use
OAK, RED	$$$	N	Hard	Strong	Heavy	F	P	F	G	G	P	E	G	E	E	G	Indoor furniture, floors, trim
OAK, WHITE	$$$	N	Hard	Strong	Heavy	F	E	G	G	G	P	E	G	E	E	G	Indoor and outdoor furniture
PINE, WHITE	$$$	N	Soft	Weak	Light	G	F	P	G	G	G	G	E	G	F	G	All-around indoor use
PINE, YELLOW	$$	N	Hard	Strong	Heavy	F	F	P	G	G	G	G	F	F	F	G	Carpentry
POPLAR, YELLOW	$$	N	Soft	Weak	Medium	G	P	G	F	F	F	G	E	P	G	E	Toys, drawer sides, utility
REDWOOD	$$$	N	Medium	Weak	Light	E	E	G	G	P	P	G	E	P	F	G	All outdoor projects
TEAK	$$$$	N	Hard	Strong	Medium	E	E	G	E	G	F	E	G	G	G	F	Boats, outdoor furniture
WALNUT	$$$$	N	Hard	Strong	Heavy	E	G	F	G	E	G	G	E	E	G	F	Fine furniture

NOTES:
1. ($$$$) Very expensive ($$$) Expensive ($$) Least expensive
2. (N) National (R) Regional
3. E Excellent G Good F Fair P Poor

Written by Peter J. Stephano Photograph: Marty Baldwin

Summer

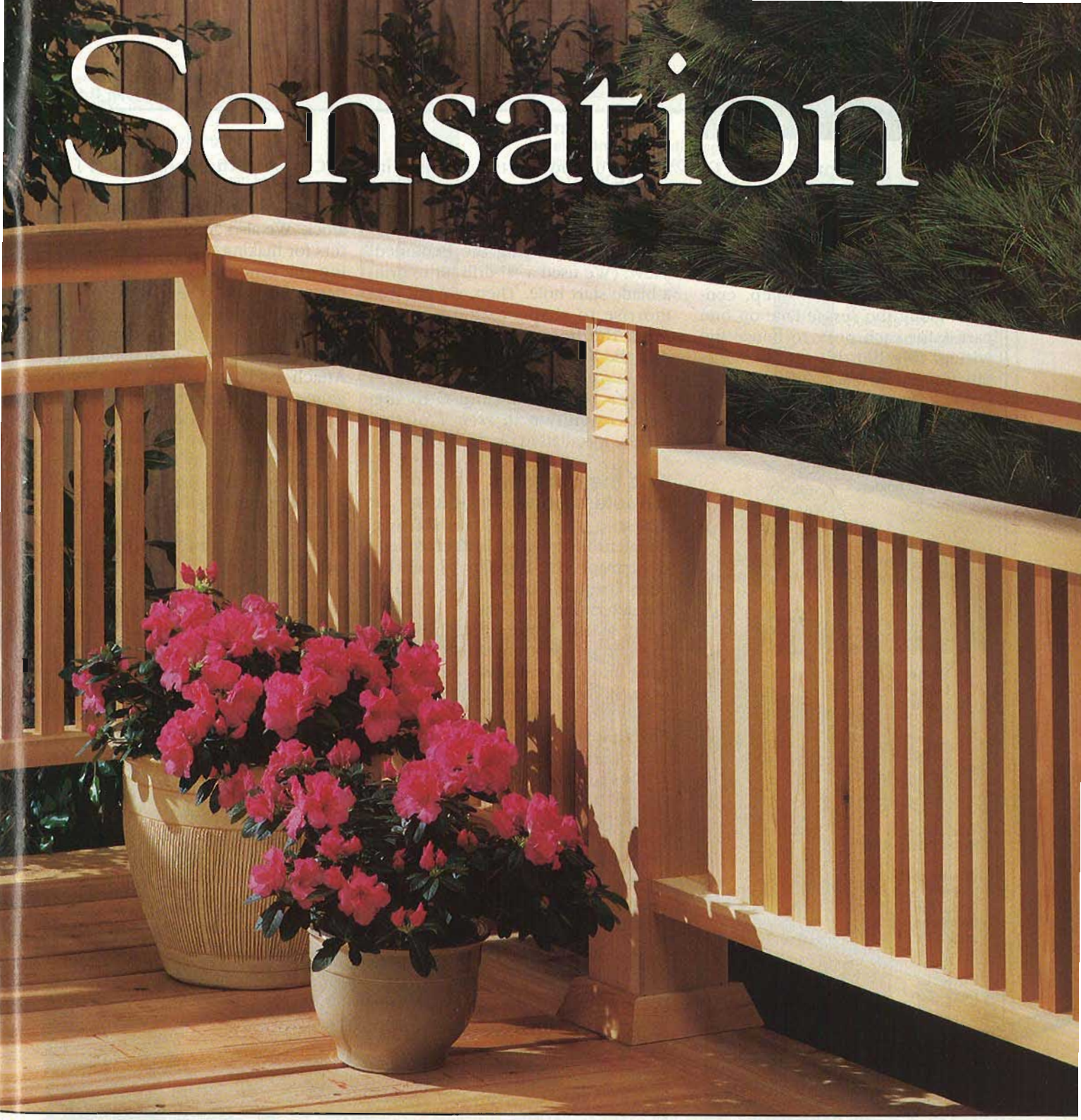


Let this impressive deck railing light up your outdoor life

This summer, move your woodworking outdoors by building and installing this deck delight. Our railing system relies on few visible fasteners, using instead tenoned rails and stiles to provide strength and support. Better still, it features lighted posts that accent your handiwork in the evenings while allowing for safe movement around your new or remodeled deck.

Note: If you're building a new deck, install the 4×4 corner posts first, and then center the other 4×4 posts between the corner posts. We kept our posts at or below 4' on center. Then, whether using new or existing posts, review the four-step Railing Installation drawing and the

Sensation



instructions in this article for the overall method of fitting the railing system between the posts before you begin crosscutting the rails (D, E) to length.

We recommend having a licensed electrician install the wiring for your deck lighting to meet codes in your area.

Determine the part sizes to fit your deck posts

1 Cut your 4×4 posts so they protrude 28½" above the surface of the deck where shown in *step 1* of the Railing Installation drawing located on *page 73*.

2 Attach a porcelain light fixture centered on the top of each interior post (not the corner posts). Have the fixtures wired as shown on the Deck Wiring drawing located on *page 72*. Put bulbs in the fixtures and test the wiring. Then, unplug the system and remove the bulbs until the construction is completed.

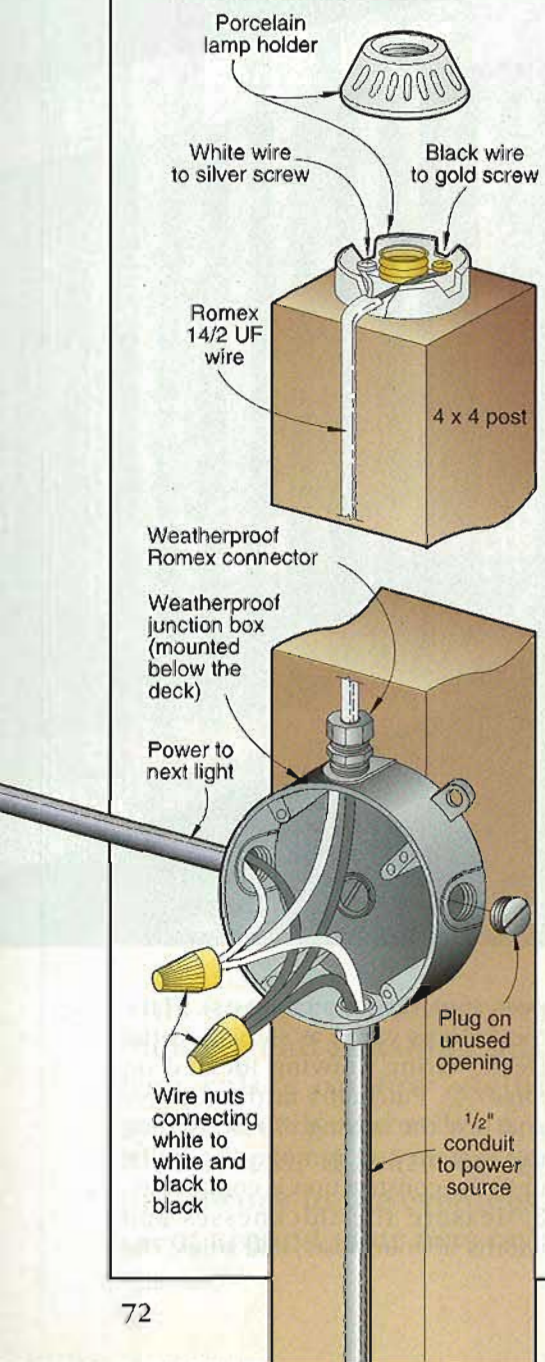
3 Measure the thicknesses and widths of your posts, and adjust the

Continued

size of the post covers (A, B, C) accordingly. Then, cut the post covers to size to fit your posts. Our posts measure 3½" in thickness and width. Note that only the corner posts incorporate part C.

4 Cut a ¾" groove ⅜" deep, centered along the *inside* face on one part A for each post, to house the wiring. (We did this on our tablesaw fitted with a dado blade.)

DECK WIRING


Porcelain lamp holder
White wire to silver screw
Black wire to gold screw
Romex 14/2 UF wire
4 x 4 post
Weatherproof Romex connector
Weatherproof junction box (mounted below the deck)
Power to next light
Plug on unused opening
Wire nuts connecting white to white and black to black
½" conduit to power source

5 Lay out and cut the mortises in parts B and C where shown on the Railing Installation and Exploded View drawings and the Mortise detail accompanying the Exploded View. (We used a ¾" drill bit to drill a blade start hole. Then, we cut the mortise to shape with a jigsaw.) Mark the hole centerpoints, and drill the holes for screwing the louvers in place later.

6 Tape parts A, B, and C to the posts as shown in *step 1* of the Railing Installation drawing.

Add the rails and balusters between posts

1 Using *step 2* on the Railing Installation drawing for reference, determine the lengths of railing parts D and E. Cut the rails (D, E) to the determined lengths.

2 Cut a 1×3" tenon on each end of the mid and bottom rails (E) to fit snug into the previously cut mortises in the post covers B and C.

3 Use the equation in *step 3* of the Railing Installation drawing to determine if you'll need an even or odd number of balusters (F) between the posts. Next, locate and mark the centerpoints for the balusters (F). Drill a 1" hole at each centerpoint. (To speed up the process, we used a fence on our drill-press table to keep the holes centered.)

4 Crosscut the balusters (F) to length. (We ripped our balusters to thickness and width from 2×8 stock. We also cut a few extra balusters for making test cuts when forming the tenons on the ends in the next step.)

5 Fit your tablesaw with a dado blade, and cut 1"-square tenons ¾" long on the ends of each baluster. Attach a 45° support to your miter gauge, and cut a chamfer on each tenon of the balusters as shown in the photo below. Test-cut the extras first to verify the setting. The octagonal ends on the balusters should fit snug inside the 1" holes in the rails (E).

6 Clamp the tenoned balusters between the rails.

7 With the post covers still taped in place, screw the As and the non-mortised Cs to the posts. *Do not secure any of the mortised pieces to the posts yet.* Remove the mortised pieces (B, C), and glue and screw each section of railing together in the configuration shown on *step 4* of the Railing Installation drawing. Slide each railing section between the 4×4 posts, and screw the sections in place.

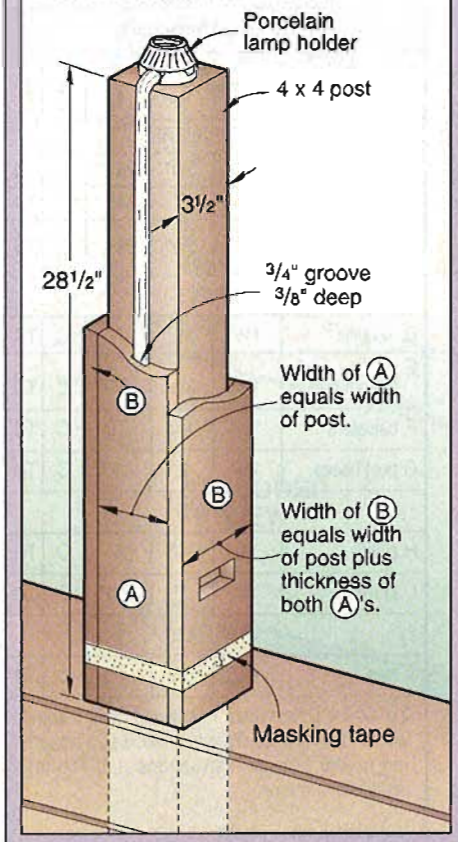
8 With the post covers (A–C) and railing (D–F) in place, bevel-rip one face of the stock that will be used for the base pieces (G) at 20°. Then,

Continued

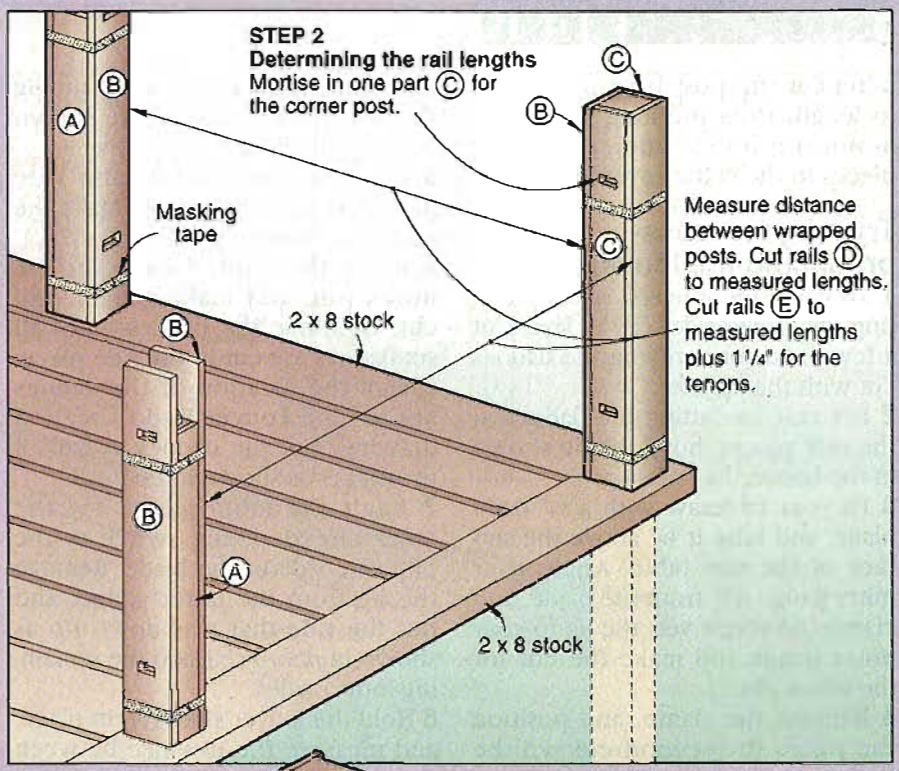
Using a 45°-angled support secured to your miter-gauge extension, trim the corners off the square-cut tenons to fit into the 1" holes in the rails.

RAILING INSTALLATION

STEP 1
Wrapping and wiring the post


Porcelain lamp holder
4 x 4 post
3½"
28½"
¾" groove ⅜" deep
Width of (A) equals width of post.
Width of (B) equals width of post plus thickness of both (A)'s.
Masking tape

STEP 2
Determining the rail lengths
Mortise in one part (C) for the corner post.

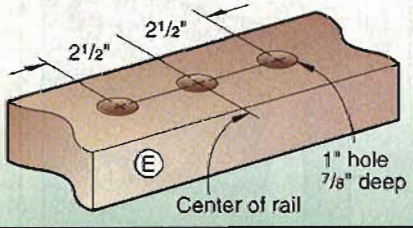

Masking tape
2 x 8 stock
2 x 8 stock
Measure distance between wrapped posts. Cut rails (D) to measured lengths. Cut rails (E) to measured lengths plus 1¼" for the tenons.

STEP 3
Locating the balusters

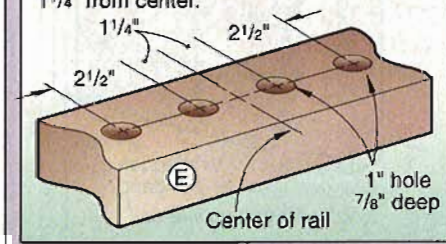
Determine the number of balusters by using the following formula.

$$\frac{\text{measured length} - 9.25}{2.5} = \text{number of posts rounded to nearest whole number}$$

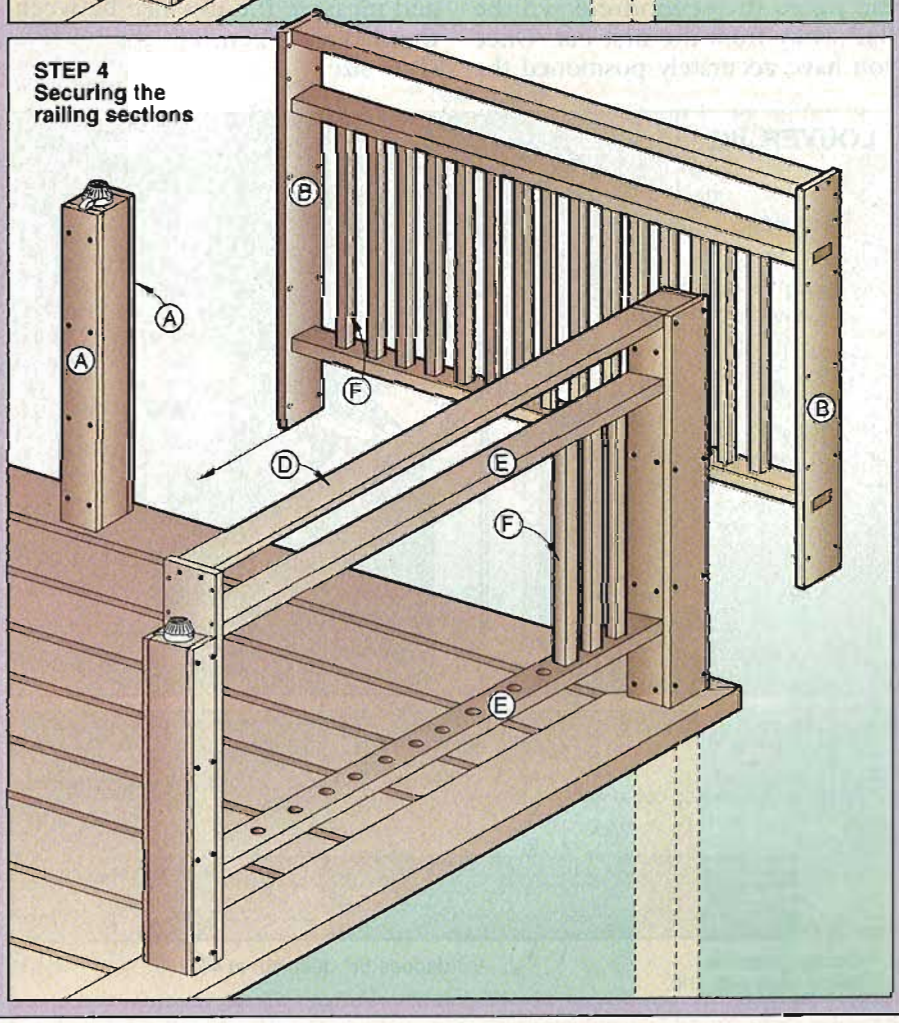
If you have an odd number of balusters, start with the center baluster and work out.



If you have an even number of balusters, start baluster centerpoints 1¼" from center.



STEP 4
Securing the railing sections



Summer Sensation

miter-cut the post base pieces (G) to length from the long strip. Drill mounting holes, and secure the pieces to the cedar-covered posts.

Try a jig for mass-producing the louvers

1 To make the louvers, start by cutting the louver sides (H) to size. Cut a few extra for verifying the dadoes cut with the jig later.

2 For ease in cutting the dadoes in the side pieces, build the jig shown in the Louver Jig drawing.

3 Fit your tablesaw with a ¼" dado blade, and raise it ⅛" above the surface of the saw table. Angle your miter gauge 45° from the blade, and clamp (no screw yet) the jig to your miter gauge and make the cut for the index pin.

4 Remove the clamp, and position the jig so the second cut will be 31/32" away from the first cut. Once you have accurately positioned the notch from the blade, screw the jig to your miter gauge where shown on the Louver Jig drawing.

5 Position one end of one side piece (H) against the stop. Make the first cut as shown in *photo B*.

6 Place the angled dado on the index pin, and make the second cut. Continue the process until all six dadoes are cut in the side piece. Check the location of the dadoes against the Louver Dado Location drawing. Cut the dadoes in half of the pieces as shown in *photo B*.

7 Angle the miter gauge 45° the other direction, and switch to the opposite side of the blade. Remove the jig from the miter gauge, and put the side that was down *up* as shown in *photo C*. Dado the remaining louver sides.

8 Hold the louver sides (H) in place, and measure the distance between the dadoes. Then, cut the louvers (I) to size.

Continued

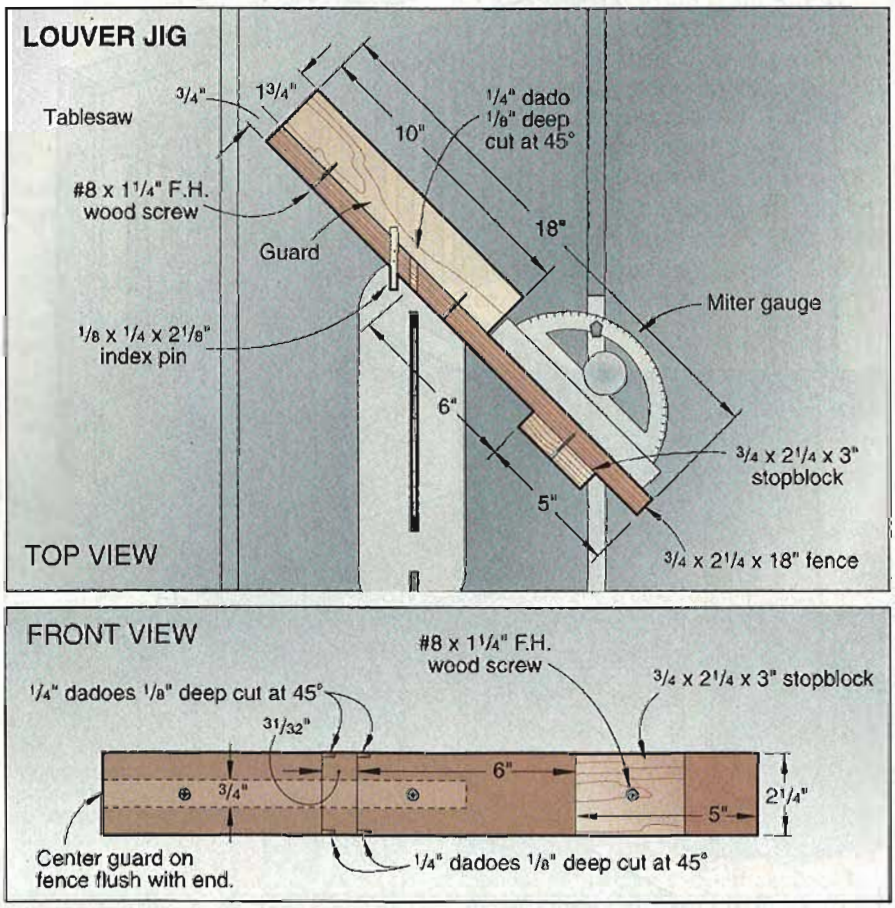
Bill of Materials

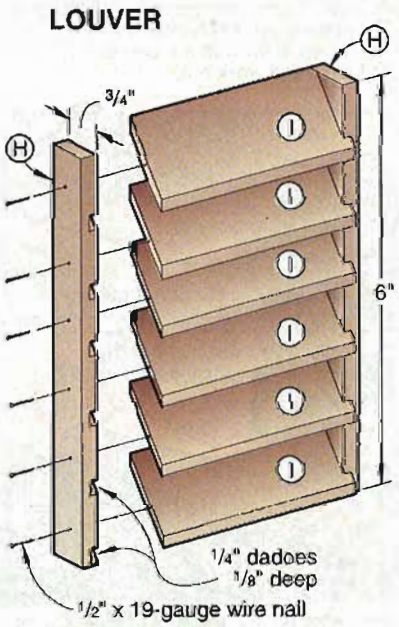
Part	Finished Size T	W	L	Matl.	Qty.
POST COVERS					
A post covers	¾"	3½"	28½"	C	TD
B post covers	¾"	5"	34½"	C	TD
C corner post covers	¾"	3½"	34½"	C	TD
RAILING					
D top rails	1½"	3½"	TD	C	TD
E mid & bottom rails	1½"	3½"	TD	C	TD
F balusters	1¼"	1¼"	TD	C	TD
G post bases	1¼"	2"	7½"	C	TD
LOUVER					
H sides	¼"	¾"	6"	C	TD
I louvers	¼"	1"	3¼"	C	TD
TOP RAIL					
J rails	1½"	6¼"	TD	C	TD

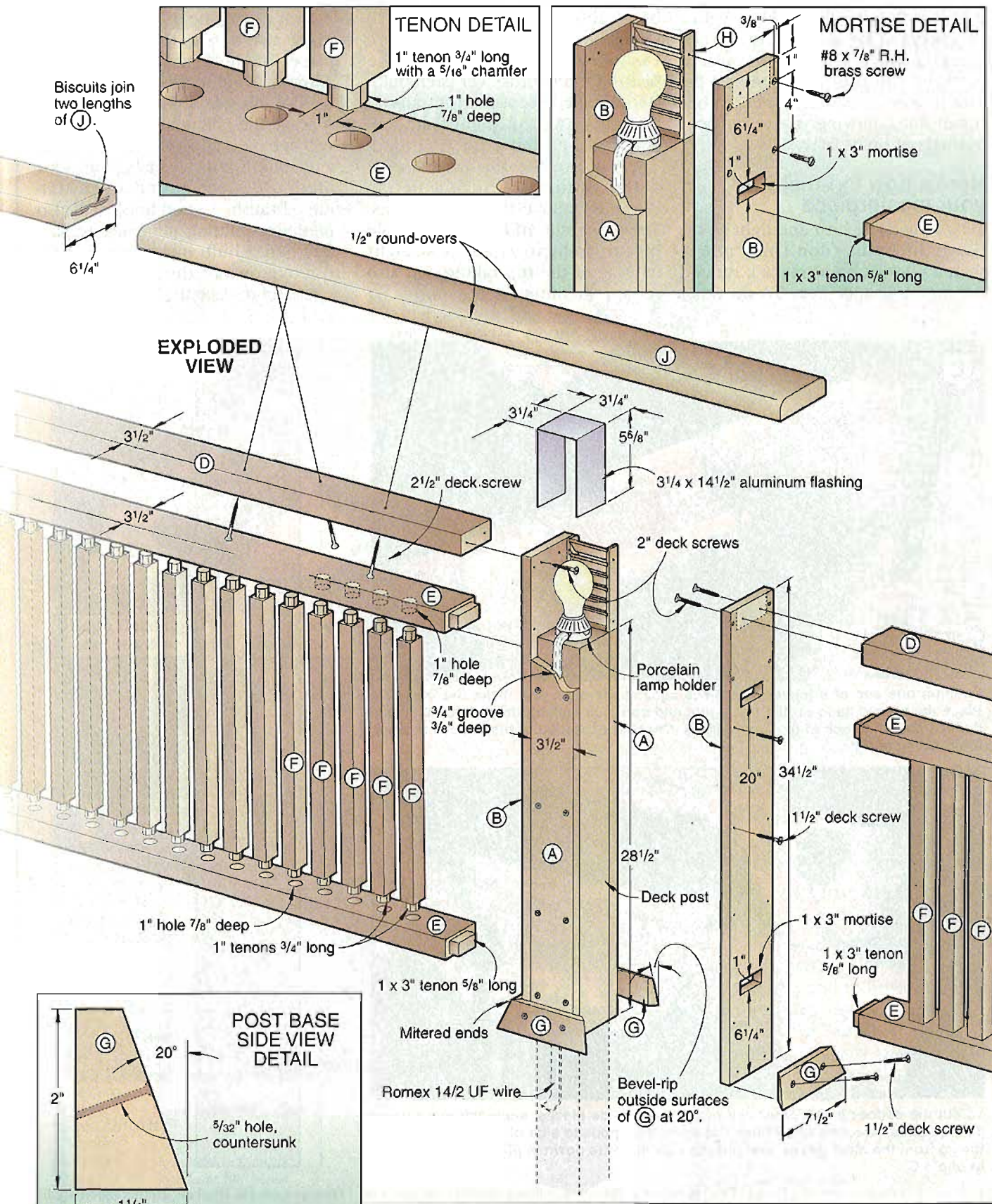
TD–To Be Determined. Initially cut parts marked with a TD oversized. Trim to finished size according to the how-to instructions and Railing Installation drawing.

Materials Key: C–cedar

Supplies: 1½", 2", and 2½" deck screws; #8x⅞" brass wood screws; ½"x19-gauge wire nails, aluminum flashing; porcelain fixtures; Romex 14/2 UF wire; wire nuts, weather-proof junction boxes; exterior finish.






TENON DETAIL
1" tenon 3/4" long with a 5/16" chamfer
1" hole 7/8" deep
1"
MORTISE DETAIL
3/8"
#8 x 7/8" R.H. brass screw
1"
4"
6 1/4"
1 x 3" mortise
1"
1 x 3" tenon 5/8" long
Biscuits join two lengths of J.
6 1/4"
1/2" round-overs
EXPLODED VIEW
3 1/4"
3 1/4"
5 5/8"
3 1/4 x 14 1/2" aluminum flashing
3 1/2"
3 1/2"
2 1/2" deck screw
2" deck screws
1" hole 7/8" deep
3/4" groove 3/8" deep
Porcelain lamp holder
3 1/2"
20"
34 1/2"
1 1/2" deck screw
28 1/2"
Deck post
1" hole 7/8" deep
1" tenons 3/4" long
1 x 3" tenon 5/8" long
1 x 3" mortise
1"
1 x 3" tenon 5/8" long
Mitered ends
6 1/4"
Romex 14/2 UF wire
Bevel-rip outside surfaces of G at 20°.
7 1/2"
1 1/2" deck screw
POST BASE SIDE VIEW DETAIL
20°
2"
5/32" hole, countersunk
1 1/4"

Summer Sensation

9 Nail each louver assembly together, checking for square. Screw (no glue) the louver assemblies in place between the post cover pieces B. The louver assemblies need to be removable, allowing you to replace burned-out bulbs later.

Here's how to finish your masterpiece

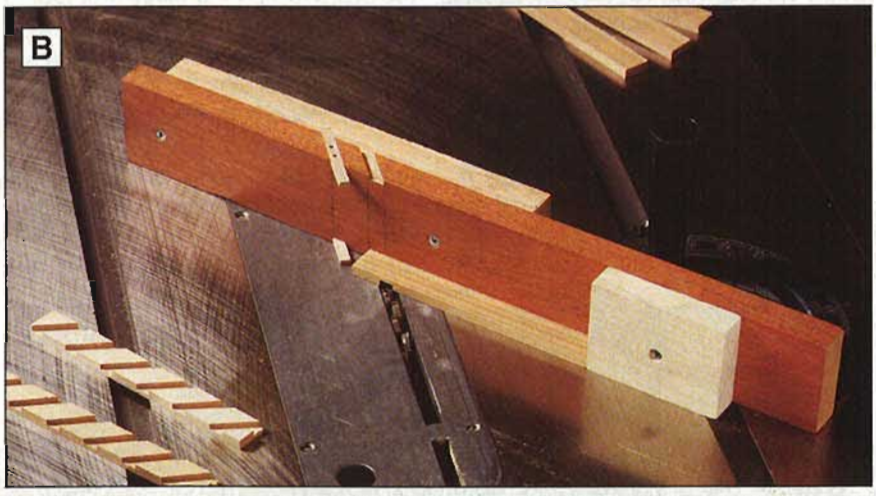
1 To reflect the heat and light from the light bulbs (don't use more than a 60-watt bulb) make a reflector for each light box. To do this, bend aluminum flashing in a U-shape where shown on the Exploded View drawing. Fit the heat/light reflector over each bulb.

2 Rip and crosscut the top rails (J) to length (we cut them from 2×8 stock). Rout and sand ½" roundovers along the top edges. (We miter-cut the top rails, centering the miter above the corner posts. Then, we cut and glued a double biscuit joint to connect straight lengths of the top railing and also to join the mitered corners.)

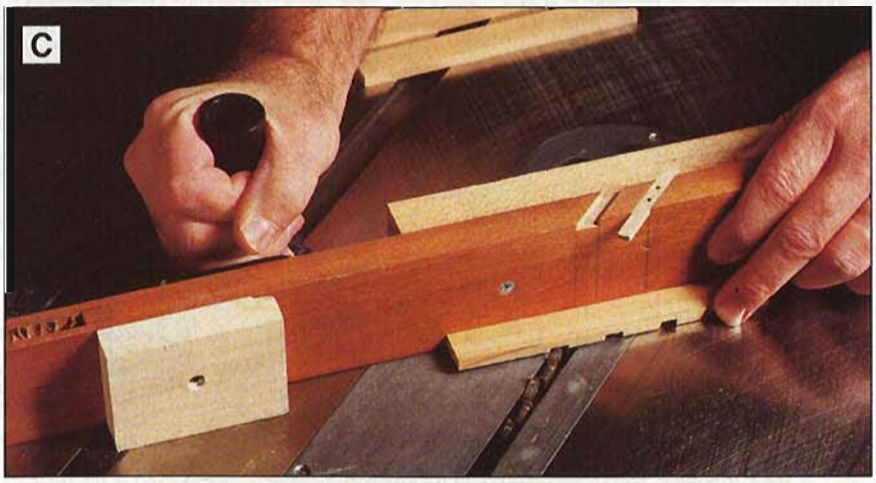
3 Drill angled holes through the D rails, and screw the top rails in place. The holes need to be angled, allowing you access to work from the bottom side of the D rails.

4 Leave the railing unfinished and it will age naturally. Or, seal the posts and railing with a quality outdoor finish. (We recommend a penetrating oil finish. A good finish will also minimize splitting and cracking.)

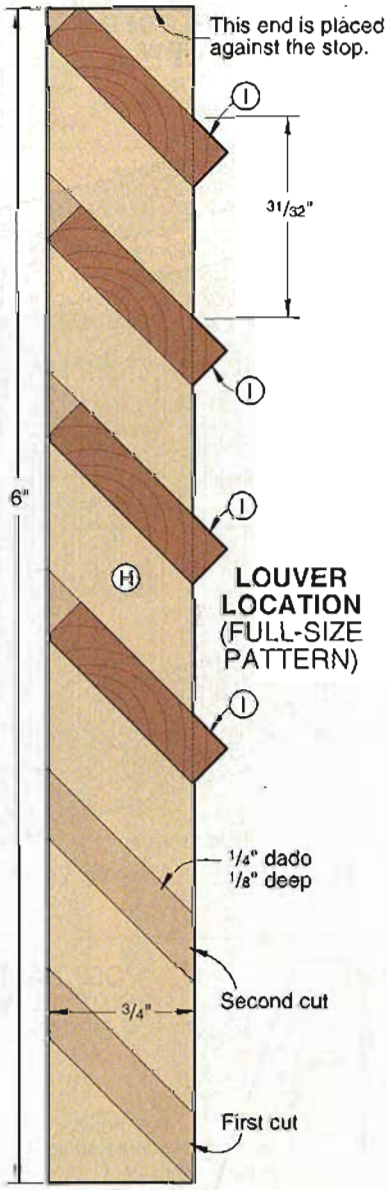
5 When a bulb burns out, simply remove one of the louver assemblies and replace the bulb.



Position one end of a louver side piece against the stop, and make the first cut. Place the angled dado on the index pin, and continue making the cuts until all six dadoes are cut in half of the louver sides. Check the location of the dadoes against the drawing at right.



To cut the dadoes in the other half of the louver side pieces, angle the miter gauge 45° the other direction and switch the jig to the opposite side of the blade. Remove the jig from the miter gauge, and put the side that was down in photo B up as shown in photo C.



Written by Marlen Kemmet Project Design: James R. Downing Illustrations: Lorna Johnson Photographs: Bill Hopkins; Hetherington Studio

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600-788
8 bit, 1/2" shank Picture Frame Set
List: $266.00 Sale: $189.90

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Picture Frame Set includes these 1/2" shank, carbide tipped bits:

Item	Description	Cutting Diameter	Cutting Length	Overall Length	Price
602-500	Edge Beading, 1/4" bead	7/8"	3/8"	2-7/16"	$34.90
614-564	Round Nose, 1/8" radius	1/4"	5/8"	2-1/4"	$24.70
615-690	90º V-Groove	3/4"	5/8"	2-1/4"	$27.80
637-850	Cove, 1/2" radius	1-3/4"	3/4"	2-5/8"	$35.90
638-754	Roundover, 1/4" radius	1"	1/2"	2-7/16"	$28.90
638-817	Roundover, 3/8" radius	1-1/4"	9/16"	2-1/2"	$34.30
638-880	Roundover, 1/2" radius	1-1/2"	3/4"	2-5/8"	$39.60
651-502	Bowl & Tray, 1/4" radius	1-1/4"	5/8"	2-5/16"	$29.90

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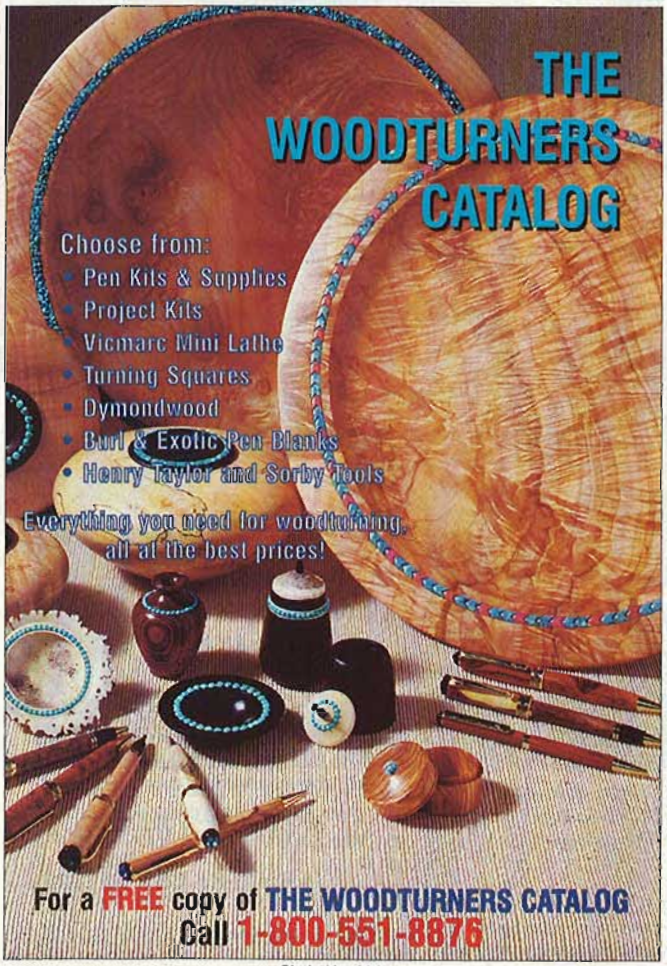
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Gas blast keeps finishes fresh for future use

What a waste! You've just opened a can of polyurethane—one that's darn near half full—only to find a thick skin over the surface. You know that once you break through the congealed varnish, you'll probably have to strain the product, if there's any that's usable at all.

You don't have to put up with that. A spurt of Bloxygen into the can before closing it keeps the finish from curing during storage.

When sprayed into a container, Bloxygen, a heavier-than-air blend of inert gases, settles on the surface of the contents. It forms an oxygen-free blanket to keep the finish from hardening.

To test Bloxygen, I poured about an inch of polyurethane varnish into each of two jars one Monday morning. I screwed the lid tightly on one, and sprayed a two-second burst of Bloxygen into the other before screwing the lid on.

I opened both jars every Monday morning thereafter for six weeks and allowed them to sit open for 20-30 minutes. After this simulated use, I sprayed Bloxygen into the test jar and recapped both containers. The varnish in the untreated jar (*left* in photo) thickened and skinned over within a few weeks; that in the Bloxygen-treated jar (*right* in photo) remained skin-free.

A can of Bloxygen feels empty right from the start (net weight of contents is a mere 0.6 oz.). But, it contains enough gas for about 75 two-second bursts, the prescription for treating quart-size or smaller cans. (A gallon can requires a four-second spritz.)

Bloxygen keeps finishes fresh and helps reduce waste. It's just the ticket for infrequently used materials—the stuff you sometimes end up throwing out after only one use.

—Tested by Jan Svec

PRODUCT SCORECARD

Bloxygen

Performance	★ ★ ★ ★ ★
Price	$8.95. Available through woodworking stores and catalogs.
Value	★ ★ ★ ★ ★

IronWood Designs, P.O. Box 13838, San Luis Obispo, CA 93406. Call or fax 805/542-9219. Visit: www.bloxygen.com or E-mail: IronWood.Designs@pobox.com

Continued on page 82

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Roundover Bits
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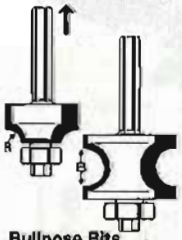
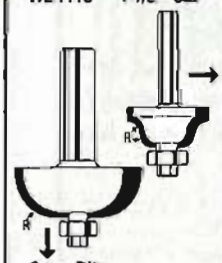
1/4" Shank	Radius	
WL-1040	1/16"	$9.
WL-1041	1/8"	$9.
WL-1042	3/16"	$9.
WL-1043	1/4"	$9.
WL-1044	5/16"	$10.
WL-1045	3/8"	$11.
WL-1046	1/2"	$13.
1/2" Shank		
WL-1049	1/8"	$9.
WL-1042-5	3/16"	$9.
WL-1050	1/4"	$9.
WL-1044-5	5/16"	$10.
WL-1051	3/8"	$12.
WL-1052	1/2"	$13.
WL-1053	5/8"	$16.
WL-1054	3/4"	$18.
WL-1055	7/8"	$25.
WL-1056	1"	$27.
WL-1057	1-1/8"	$30.
WL-1058	1-1/4"	$30.



Bullnose Bits
with Bearing

1/4" Shank • Bead Opening		
WL-1100	1/4"	$12.
WL-1101	3/8"	$14.
WL-1102	1/2"	$16.
WL-1103	5/8"	$18.
WL-1104	3/4"	$19.
1/2" Shank		
WL-1110	1/4"	$12.
WL-1111	3/8"	$14.
WL-1112	1/2"	$16.
WL-1113	5/8"	$18.
WL-1114	3/4"	$19.
WL-1115	1"	$22.
WL-1116	1-1/8"	$25.
WL-1117	1-1/4"	$28.
WL-1118	1-1/2"	$32.



Cove Bits

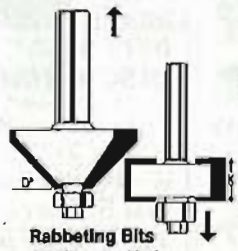
1/4" Shank • Radius		
WL-1159	1/8"	$10.
WL-1160	3/16"	$10.
WL-1161	1/4"	$11.
WL-1162	3/8"	$13.
WL-1163	1/2"	$14.

Cove Bits (continued)

1/2" Shank		
WL-1169	1/8"	$10.
WL-1170	1/4"	$11.
WL-1171	3/8"	$13.
WL-1172	1/2"	$14.
WL-1173	5/8"	$18.
WL-1174	3/4"	$20.

Chamfer Bits

1/4" Shank • Degree		
WL-1180	15°	$10.
WL-1181	25°	$10.
WL-1182	45°	$12.
WL-1183	45°	$14.
(for up to 3/4" material)		
1/2" Shank		
WL-1184	45°	$10.
WL-1185	11-1/2°	$12.
WL-1186	15°	$12.
WL-1187	22-1/2°	$12.
WL-1188	30°	$14.
WL-1189	45°	$15.
WL-1190	45°	$22.
(for up to 1-1/4" material)		



Rabbeting Bits

1/4" Shank • Kerf		
WL-1220	1/2"	$11.
WL-1220-2	1/16"	$10.
WL-1220-3	1/8"	$10.
WL-1220-4	1/4"	$10.
WL-1220-5	3/8"	$10.
1/2" Shank		
WL-1225	1/2"	$11.
WL-1225-2	1/16"	$10.
WL-1225-3	1/8"	$10.
WL-1225-4	1/4"	$10.
WL-1225-5	3/8"	$10.
WL-1225-6	3/4"	$12.

Roman Ogee Bits

1/4" Shank • Radius		
WL-1230	5/32"	$13.
WL-1231	1/4"	$15.
1/2" Shank		
WL-1235	5/32"	$13.
WL-1236	1/4"	$15.

Double Roman Ogee

1/4" Shank • Radius		
WL-1240	5/32"	$18.
WL-1241	1/4"	$20.
1/2" Shank		
WL-1245	5/32"	$18.
WL-1246	1/4"	$20.

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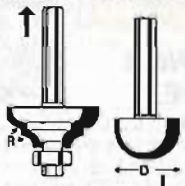
1/4" Shank • Radius		
WL-1250	5/32"	$18.
WL-1251	1/4"	$20.
1/2" Shank		
WL-1252	5/32"	$18.
WL-1253	1/4"	$20.

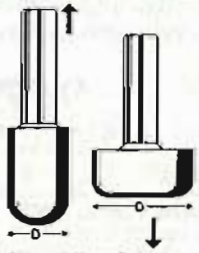


Core Box Bits

1/4" Shank • Diameter		
WL-1370	1/8"	$10.
WL-1371	1/4"	$8.
WL-1371-1	3/8"	$9.
WL-1372	1/2"	$10.
WL-1373	3/4"	$12.

Roundnose/Core Box

1/2" Shank • Diameter		
WL-1375	1/4"	$8.
WL-1375-1	3/8"	$11.
WL-1376	1/2"	$12.
WL-1377	3/4"	$14.
WL-1378	1"	$16.

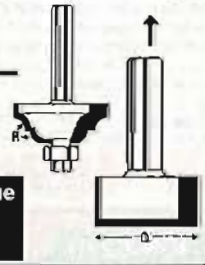


Bowl & Tray Cutter

1/4" Shank • Diameter		
WL-1380	7/16"	$13.
WL-1381	3/4"	$15.
1/2" Shank		
WL-1385	3/4"	$15.
WL-1386	1-1/4"	$18.

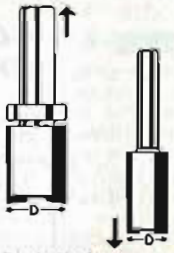
Dado & Planer Bit

1/4" Shank • Diameter		
WL-1390	3/4"	$12.
1/2" Shank		
WL-1391	3/4"	$12.
WL-1392	1"	$14.
WL-1393	1-1/4"	$15.
WL-1394	1-1/2"	$16.
WL-1395	2"	$28.



Pattern Cutting Bit

1/4" Shank • Diameter		
WL-1400	1/2"	$12.
WL-1401	5/8"	$12.
WL-1402	3/4"	$12.
1/2" Shank		
WL-1405	3/4"	$15.
WL-1406	1-1/8"	$16.



Straight Bits

1/4" Shank • Diameter		
WL-1001	1/8"	$10.
WL-1002	3/16"	$5
WL-1002-5.5	5.5mm	$5.
(for undersized 1/4" plywood)		
WL-1003	1/4"	$5.
WL-1004	5/16"	$5.
WL-1005	3/8"	$5.
WL-1006	15/32"	$5.
(for undersized 1/2" plywood)		
WL-1007	1/2"	$6.
WL-1008	9/16"	$6.
WL-1009	5/8"	$7.
WL-1010	23/32"	$8.
(for undersized 3/4" plywood)		
WL-1011	3/4"	$9.
WL-1012	1"	$10.
1/2" Shank		
WL-1020	15/64"	$5.
(for undersized 1/4" plywood)		
WL-1021	1/4"	$5.
WL-1019	5/16"	$5.
WL-1022	3/8"	$5.
WL-1023	7/16"	$5.
WL-1024	15/32"	$5.
(for undersized 1/2" plywood)		
WL-1025	1/2"	$6.
WL-1027	5/8"	$8.
WL-1028	23/32"	$8.
(for undersized 3/4" plywood)		
WL-1029	3/4"	$9.

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For up to 5/8" material
WL-1420-2 1/4" shank $25.

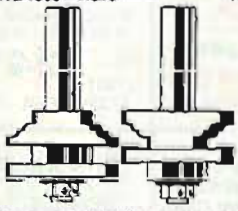
For 1/2" to 3/4" material
WL-1420-1 1/2" shank $30.

For material 3/4" to 1-1/4"
WL-1420 1/2" shank $38.

For the Shaper
Lock Mitre WL-1581 $40.

Horizontal Panel Raiser with Undercutter • 1/2" Shank

WL-1346	Ogee	$49.
WL-1347	Traditional	$49.
WL-1348	Convex (Cove)	$49.
WL-1359	12° Facecut with Quarter Round	$49.
WL-1363	Wave	$49.



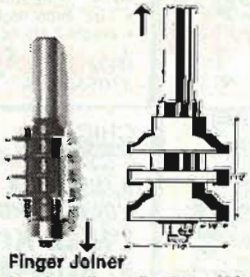
2-piece Rail & Stile Cutter Sets

1/2" Shank		Set
WL-1360	Ogee Profile	$59.
WL-1361	Roundover	$59.
WL-1362	Cove & Bead	$59.

1-piece Rail & Stile Cutter Sets

Just raise the cutter to make the matching cut. No changing or reversing.

1/2" Shank		
WL-1365	Ogee Profile	$49.
WL-1366	Roundover	$49.
WL-1367	Cove & Bead	$49.
WL-1368	Wedge	$49.
WL-1374	Dbl Roundover	$49.



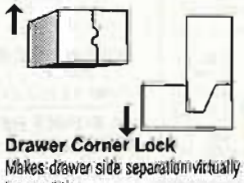
Finger Joiner Router Bit WL-1429 $39.

For the Shaper WL-1580 $89.

Reversible Glue Joint

WL-1430 1-3/4" Diam $35.

For the Shaper WL-1706 $35.



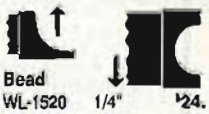
Drawer Corner Lock

Makes drawer side separation virtually impossible
1/2" Shank
WL-1435 For 1/2" material $30.

SHAPER CUTTERS
3/4" BORE

Corner Round

WL-1509	1/8"	$22.
WL-1510	1/4"	$24.
WL-1511	3/8"	$26.
WL-1512	1/2"	$26.
WL-1513	3/4"	$30.
WL-1514	1"	$32.
WL-1515	1-1/4"	$38.

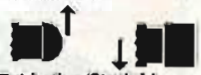


Bead

WL-1520	1/4"	$24.
WL-1521	3/8"	$26.
WL-1522	1/2"	$26.
WL-1523	3/4"	$28.
WL-1524	1"	$30.

Flute

WL-1530	1/4"	$24.
WL-1531	3/8"	$26.
WL-1532	1/2"	$26.
WL-1533	3/4"	$28.
WL-1534	1"	$30.



Rabbeting/Straight

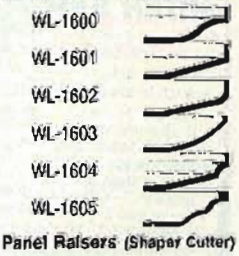
WL-1540	1/4"	$24.
WL-1541	3/8"	$26.
WL-1542	1/2"	$26.
WL-1543	3/4"	$28.
WL-1544	1"	$30.
WL-1545	1-1/2"	$32.
WL-1546	2"	$48.

SHAPER CUTTERS 3/4" BORE

1-piece Rail & Stile

Just raise the cutter to make the matching cut. No changing or reversing.

WL-1500	Roman Ogee	$89.
WL-1501	Roundover	$89.
WL-1502	Cove & Bead	$89.
WL-1503	Dbl Roundover	$89.



Panel Raisers (Shaper Cutter)
3/4" Bore

WL-1600	Ogee	$59.
WL-1601	15° Facecut	$59.
WL-1602	18° Traditional	$59.
WL-1603	Convex (Cove)	$59.
WL-1604	12° Facecut with Quarter Round	$59.
WL-1605	Wave	$59.

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- Pin end type

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ITEM 35024-0FEA

ROUTER SPEED CONTROL

Get better results and longer bit life when routing tough woods, plastics, even aluminum. Plug your router into the control unit and you instantly have a variable-speed tool. Works with any universal AC/DC brush type motor, 15 amps and under. Will not work with soft or slow start motors.

ITEM 37359-1FEA ~~$24.99~~ **$19.99**

Pittsburgh
Pittsburgh LIFETIME WARRANTY

SELF-ALIGNING
1/2 OFF!

CORNER CHISEL

A slight hammer tap could give you perfect corners every time. Self-aligning design makes a crisp 90° angle with just a few hammer taps. Saves hours of work. Perfect for hinge plates.
- Spring loaded • 5/8" working depth
- 3/8" cutting edge

ITEM 37041-4FEA ~~$6.99~~ **$3.49**

CENTRAL MACHINERY

5 SPEED BENCH DRILL PRESS

- 2" stroke, 8-1/4" swing
- Speeds: 620, 1100, 1720, 2340 and 3100 RPM
- 1/3 HP motor moves at 1720 RPM
- Table: 8-1/4" square • 1/2" chuck
- 8-1/4" maximum distance spindle to table
- 22-1/2" high, 47 lbs.

ITEM 05901-0FEA **$48.99**

DRILL PRESS WITH KEYLESS CHUCK
- No more lost chuck keys

ITEM 34231-6FEA **$49.99**

PORTER-CABLE
LIMITED QUANTITIES
CUT 2x LUMBER IN ONE PASS

Porter Cable 345

SAW BOSS™

- Power enough to cut wood, masonry, stone and tile • 6" blade size
- Motor: 9 amp, 120V
- Includes: 6" thin Kerf combination blade
- Cutting capacity @ 45°: 1-9/16"; @ 90°: 1-15/16"
- Net weight: 8 lbs.
- Factory reconditioned, factory perfect

~~$99.99~~ **$79.99**
ITEM 51702-1FEA

Pittsburgh
Pittsburgh LIFETIME WARRANTY

2 PC. 3/4" HEAVY DUTY PIPE CLAMP SET

Constructed from heat-treated cast iron, these durable clamps keep your work rock steady. Just screw the handle side onto a 3/4" threaded pipe and slide the spring loaded end on. You're ready to go! Pipe not included.
- Handle screw operating range: 2-1/8"
- 1-1/2" throat depth
- Weight: 2-7/16 lbs.

ITEM 31255-1FEA ~~$6.99~~ **$3.99**

1/2" PIPE CLAMP
- 1-1/2" throat depth
- Weight: 1-4/5 lbs.

ITEM 37056-2FEA ~~$5.99~~ **$2.99**

CENTRAL PNEUMATIC

2 HP, 115 PSI, 6-1/2 GALLON AIR COMPRESSOR

Perfect for painting or air tools. 2 horsepower motor works great in the home or workshop.
- 11 amps, 115V, 60 Hz, 2800 RPM
- 3.4 CFM @ 70 PSI
- Oil lubrication
- 2.6 CFM @ 115 PSI

~~$159.99~~ **$139.99**
ITEM 36625-4FEA

1/2" AIR F.R.L. UNIT
Filters, regulates, and lubricates your air supply.

~~$42.99~~ **$29.99**
ITEM 07358-3FEA

CHICAGO Electric Power Tools

HEAVY DUTY 4-1/2" DISC GRINDER

- 5/8"-11 spindle with 7/8" arbor adapter
- Motor: 3/4 HP, 115V, 5.18 amps
- RPM: 10,000 • Spindle lock
- 11-7/8" long

~~$39.99~~ **$19.99**
ITEM 31135-6FEA

4-1/2" FLAP DISCS
- 7/8" arbor • 13,300 maximum RPM

GRIT	ITEM	PRICE
24	37306-0FEA	$5.49
60	37307-0FEA	$5.49
120	37308-0FEA	$5.49

DELTA®

Delta 36-040

8-1/4" COMPOUND MITER SAW

Full 9 amp motor powers through stock a full 5" wide. Electric brake stops blade in seconds. Built-in arbor lock for single wrench blade changes.
- 9 amp, 115V, motor
- 11" diameter cutting surface
- Includes two 2" table extensions
- Miter cut from 0° to 45° right and left with positive stops at 0°, 15°, 22-1/2°, 30°, and 45° • Bevel cut 0° to 45°
- Capacities: 2-1/8" x 5-1/8" crosscut; 2-1/8" x 3-1/2" 45° miter; 1-1/2" x 5-1/8" 45° bevel; 1-1/2" x 3-1/2" compound cut 45° miter and 45° bevel
- Factory reconditioned, factory perfect
- 15-3/4 lbs. tool weight

~~$114.99~~ **$99.99**
ITEM 51623-3FEA

CHICAGO Electric Power Tools INDUSTRIAL

3/8", 16.8 VOLT CORDLESS DRILL KIT W/ KEYLESS CHUCK

Powerful heavy duty battery means long run times between charges. T-handle design balances drill for more accurate drilling.
- Variable speed, reversible; 0 to 900 RPM
- Includes 6 pc. drill bit set, 6 pc. screwdriver bit set, magnetic bit holder, charger, battery, *Jacobs*® keyless chuck, & carrying case • 6 torque settings
- Maximum torque: 200 in. lbs.

~~$69.99~~ **$49.99**
ITEM 36387-6FEA

16.8 VOLT REPLACEMENT BATTERY

$39.99
ITEM 36390-0FEA

PORTER-CABLE NEW!

WORK ON MOLDING AND RAISED PANELS

Porter Cable 693PK

1-1/2 HP PLUNGE ROUTER AND FIXED BASE

Dual purpose router gives you the advantage of both a plunge router and a standard router with a fixed base.
- 0 to 2-1/2" micrometer depth of cut control • 115VAC
- High torque 10 amp motor
- Includes: 1/4" and 1/2" collets
- No load speed: 23,000 RPM
- Net weight: 9-3/4 lbs.

ITEM 37311-2FEA **$189.99**

CENTRAL MACHINERY

DRILL 1/4", 3/8", & 1/2" SQUARE HOLES

MORTISING MACHINE

Make a square hole in the fraction of the time it takes by hand! Easier layout for professional mortise and tenon joints in furniture, cabinets, and restoration projects. Fence with hold down clamp keep workpieces from lifting off the table. Large capacity – up to 5" maximum height. Includes fence, work-piece clamp, and 1/4", 3/8", and 1/2" mortising chisels and bits.
- 10-7/8" x 7-3/4" base • 13-3/8" x 6" table
- 3580 RPM spindle speed
- 60 lbs. shipping wt.
- 5" max. workpiece height • 5" throat
- Accepts .745" chisel shanks
- 1/2 HP, 110V, 2.3 amps

$149.99
ITEM 35570-5FEA

★ Within the 48 States / $3.95 handling on all orders. No per item shipping and handling charge.

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FREE SHIPPING!

FOR ALL ITEMS SHOWN ON THESE TWO PAGES!

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http://www.harborfreight.com

VISE-GRIP
Vise-Grip® 248

3 PC. LOCKING WRENCH SET WITH POUCH

- Locks to three sides of a hex fastener
- Tremendous force can be applied without marring or slipping off the fastener
- Each wrench adjusts to over 16 different standard and metric wrench sizes
- Includes a wire cutter
- Jaw tips knurled for better gripping
- Built to last a lifetime

Set includes 4"/100mm locking wrench with wire cutter, 7"/175mm locking wrench with wire cutter, 10"/250mm locking wrench with wire cutter, and kit pouch.

~~$29.99~~ $24.99
ITEM 36259-1FEA

A. LASER LEVELER

Compact high leveler projects a round dot visible up to 600 feet away. Solid brass construction. Built-in spirit (bubble) level. Locking on/off switch.

- 4-1/4" long x 3/4" diameter

ITEM 36535-2FEA **$49.99**

B. HI-OUTPUT LASER POINTER

Make sure people get your point. Perfect for supervisors, teachers, product demonstrators.

- Includes two AAA batteries
- 5-1/2" long

~~$14.99~~ $9.99
ITEM 37431-4FEA

CENTRAL MACHINERY

1" BELT/ 5" DISC SANDER

Remove the belt back plate and sand all types of curves and odd shapes. With the back plate in place, you can apply pressure for faster stock removal.

- Motor: 1/3 HP, 2.4 amp, 60 Hz, 110V, 3450 RPM • Dust collection
- Table: 5" x 5", tilts to 45°
- Belt length: 30", 3450 RPM belt speed
- Shipping weight: 19 lbs.

~~$59.99~~ $49.99
ITEM 34951-1FEA

BOSCH
TOP-HANDLE JIGSAW

LIMITED QUANTITIES

Bosch 1587AVSK-50

50TH ANNIVERSARY EDITION VARIABLE SPEED JIGSAW KIT

Four position orbital action combined with 500 to 3100 SPM variable speed gives steady cuts in all kinds of materials. Three position dust blower keeps your line of cut clear - turn off for metal cutting. Limited edition features gold front gear housing and cover, carrying case with gold leaf logo. Includes one blade with 50th anniversary logo, 2 Progressor blades, standard three-blade pack, anti-splinter, steel and plastic inserts.

- Foot plate tilts to 45°
- 5 amp, 120V motor
- 1" stroke length
- 5-1/2 lbs. tool wt.

~~$149.99~~ $139.99
ITEM 51484-4FEA

PORTER-CABLE

LIMITED QUANTITIES

MADE IN JACKSON, TENNESSEE

Porter Cable 333

DUSTLESS RANDOM ORBIT FINISHING SANDER

- Swirl free finishes w/ random 3/32" orbit
- 1.7 amps; 120V; 12,000 RPM
- Accepts 5" hook & loop abrasives with five holes
- Includes canister dust collection system
- 6-1/4" tool height
- 3-1/2 lbs. tool weight
- Factory reconditioned, factory perfect

ITEM 51663-2FEA **$49.99**

CENTRAL MACHINERY

NEW!

12" DIRECT DRIVE BENCH TOP DISC SANDER

Large diameter disc sander attaches directly to a ball bearing induction motor (no brushes) for balanced, even motion. Sander produces sharp, clean cutting action for accurate finished pieces. Table tilts to 45°; 2" dust collection inlet; fan-cooled motor; miter gauge, rubber pads on base; safety switch. Includes 60 grit, 12" sanding pad.

- 1 HP, 120V, 14.0 amps
- No load speed: 1793 RPM
- Wheel diameter: 12" • Base: 13" x 10"
- Shipping wt.: 92 lbs.

ITEM 37297-0FEA **$129.99**

CENTRAL MACHINERY

LIMITED QUANTITIES

10" PLANER

- 2 HP, 110V, 1 phase, 11 amp, 8000 RPM
- 5-1/8" working distance
- 10-1/8" x 9-1/8" feed table
- 19" x 16-5/8" x 16" overall dimensions
- 10-1/8" blade size
- 2-blade cutter head
- 61 lbs. shipping weight
- Stand sold separately

~~$239.99~~ $199.99
ITEM 06935-4FEA

PLANER STAND

- 20" x 10" x 27"
- Shipping wt.: 20 lbs.

ITEM 32969-2FEA **$32.99**

NEW!

HAND HELPER-HOLDER

The second pair of hands you've always needed have arrived. 17" long flexible metal tube with two 6" long clips hold objects for you. Use to hold objects for soldering. Clamp small pieces together for gluing. Great for small woodworking projects or plastic model pieces.

ITEM 36599-2FEA **$5.99**

CENTRAL MACHINERY

Free accessories: steel stand, 2 table extensions, rip fence, blade guard and miter gauge.

10" INDUSTRIAL TABLE SAW

Motor: 2HP; Depth of cut: 3-1/8" @ 90° 2-1/8" @ 45°; Maximum rip: 25"; No load speed: 3450 RPM; Arbor: 5/8"; Table: cast iron 20-1/8" x 27"; Table extensions: steel 10-1/8" x 27"; Shipping weight: 233 lbs.

~~$319.99~~ $289.99
ITEM 36727-3FEA

DEWALT

LIMITED QUANTITIES

DeWalt DW952K-2R

INCLUDES TWO BATTERIES

3/8", 9.6 VOLT VSR CORDLESS DRILL KIT

- Dual range reversible 0-400/0-1100 RPM
- Adjustable clutch torque control
- Equipped with a keyless chuck and an electric brake • Shipping wt.: 11-3/4 lbs.
- Includes: 1 hour charger, TWO batteries, heavy duty carrying case, and a double ended screwdriver bit
- Factory reconditioned, factory perfect

ITEM 51587-3FEA **$79.99**

TUNGSTEN CARBIDE TIPPED ROUTER BIT SET

Ground to close tolerances. 1/4" shanks. Includes storage case.

15 PC. ASSORTED BITS

Includes: 1-1/4" rabbeting♦, 1-3/8" cove♦, 1-1/16" roman ogee♦, 1-1/4" rounding over♦, 1/2" flush trimming♦, 1-3/16" 45° chamfer♦, 1/2" dovetail, 3/4" straight, 1/2" straight, 3/8" V-groove, 1/4" combination panel, 1/4" straight, 1/2" mortising, 1/8" straight, and 1/4" cove ♦Includes pilot bearing

~~$45.99~~ $36.99
ITEM 31164-3FEA

4 PC. ROUNDING OVER BITS

- 1-5/32" long shanks • 2 flutes each
- Sizes: 1/8", 1/4", 3/8" & 1/2"
- Set includes 4 rounding over bits w/ pilot bearing tips

~~$25.99~~ $19.99
ITEM 33078-5FEA

NEW!

MULTIPURPOSE CLAMPS

Keep your work together. Great for metal or wood. Clamps have a steel sheet body with zinc plating. T-handle makes it easy to hold.

SIZE	ITEM	PRICE
1"	37387-0FEA	$2.99
2"	37388-1FEA	$3.99
3"	37389-1FEA	$4.99

★ Within the 48 States / $3.95 handling on all orders. No per item shipping and handling charge.

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Quality Hardwoods and Woodworking machinery For The Craftsman and Educational Institutions

Ash	4/4	Select	2.25	$ 75.00
Basswood	4/4	Select	1.95	$ 61.00
Birch	4/4	Select	2.40	$ 79.00
Butternut	4/4	1C	2.00	$ 67.00
Cherry	4/4	Select	3.75	$ 96.00
Hickory - Pecan	4/4	Select	2.00	$ 69.00
Mahogany (Genuine)	4/4	Select	3.70	$ 96.00
Maple (Hard)	4/4	Select	2.80	$ 83.00
Maple (Soft)	4/4	Select	2.20	$ 70.00
Poplar	4/4	Select	1.55	$ 62.00
Red Oak	4/4	Select	2.40	$ 78.00
Walnut	4/4	Select	3.35	$ 93.00
White Oak	4/4	Select	2.40	$ 77.00
Cedar (Aromatic Red)	4/4	1C+Btr.	1.65	$ 64.00
Cypress	4/4	Select	2.25	$ 72.00
White Pine	4/4	F.G.	1.15	$ 53.00
Yellow Pine	4/4	Clear	1.80	$ 63.00

Above prices are for 100' quantities of kilndried rough lumber sold by the Bd. Ft. FOB Mayodan, NC. Call for quantity discounts. Other sizes and grades available.

UPS Specials

Above prices are 20 bd. ft. bundles of clear kilndried lumber 3"-10" wide • 3'-7' long (Random widths & lengths) Surfaced 2 sides or rough. Delivered UPS prepaid in the Continental U.S.

NOW AVAILABLE
Thin Craft Wood
1/4" • 3/8" • 1/2"
Sizes Available

4/4 Log Run Walnut 100 bd. ft. $145

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Now is the time to build the workshop of your dreams. Get the protection and work space you need with an affordable SteelMaster Building – the strongest, most flexible clearspan protective shelter money can buy. Expertly crafted and easily assembled for years of maintenance-free enjoyment.

- **FREE Storage**
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- **Easy do-it-yourself construction**

STEELMASTER.

Circle No. 2030

PRODUCTS THAT PERFORM

Continued from page 78

E-Z Read Tape ends fractional fumbling

The E-Z Read Tape ranks as one of those products that's so simple, you wonder why it's taken so long to reach the market. Instead of just lines to divide up the inches, this tape has fractions in ⅛" increments printed right on it.

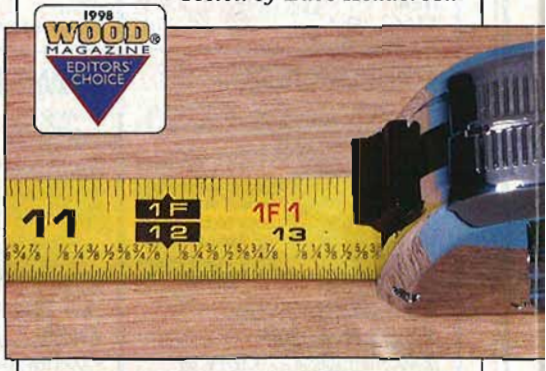
Now before you laugh it off as too simple or unnecessary, I'd venture a guess that few of us have never cut a board the wrong length because we misread the tape. I found the E-Z Read Tape eliminated that quick mental calculating we all do to figure out if it's ⅝" or ⅞", for example.

As shown in the photograph *below*, the tape also contains foot and inch numbering, as well as standard stud markings for 16" centers. While this seems like a lot of information, the tape's yellow background and bold numbers make it easy to read.

In addition to these special features, the E-Z Read Tape has the usual qualities you expect in a good tape measure including a smooth retraction mechanism and sturdy tape with triple-riveted end hook. I tested a 1"×25' model, but the company also offers ½"×12', ¾"×16', and 1"×33' models. Prices range from $5.99 to $14.99.

—Tested by Dave Henderson

1998 WOOD MAGAZINE EDITORS' CHOICE



PRODUCT SCORECARD

E-Z Read Tape, 1"×25' model

Performance	★ ★ ★ ★ ★
Price	$10.99
Value	★ ★ ★ ★ ★

Olympia Industrial, 505 South Seventh Ave., City of Industry, CA 91746. Call 818/336-4999.

FORREST'S BUY ONE & SAVE - BUY MORE & SAVE MORE SALE

THRU 9/30/98

Buy any sawblade or dado in this ad and save 10% off the sale price! Buy additional sawblade(s) or dado(s) and save even more! 15%-20%!

Call Forrest now for details — (800) 733-7111 or (973) 473-5236

EXCLUSIVE! FREE OFFER

$23 Value!

144 pages full of photos! Check-lists to help you keep every power tool in your shop working perfectly. A find-it-fast trouble-shooting chart tells you how to identify and fix problems. Easy-to-follow photo sequences show you how to get exact alignment every time.

OR Measure Twice, Cut Once or 300 Great Shop Tips or Forrest Logo cap FREE with any saw blade or Dado listed & purchased from this ad. You must mention you saw this offer in Popular Woodworking® Magazine, when ordering.

Offer Expires Sept. 30, 1998. One book per order.
ORDER NOW SUPPLIES ARE LIMITED.

FREE shipping thru 9/30/98

FREE $45 in sharpening coupons with each order placed by 9/30/98

Mention *Popular Woodworking* to receive discount and free coupons and free shipping

Coupons valid thru 6/30/99 and good on all makes of carbide blade and dado set sharpening.

WOODWORKER II — 6" – 7 1/4" – 14"

With this one ALL PURPOSE blade you can RIP & CROSSCUT 1"-2" ROCKHARDS and SOFTWOODS resulting in a **SMOOTH AS SANDED** surface. PLY-VENEERS of OAK and BIRCH will crosscut with NO BOTTOM SPLINTER at moderate feed rates.

- DOUBLE HARD and 40% STRONGER C-4 CARBIDE
- Ends blade changing
- Ends scratchy saw cuts
- Ends second-step finishing
- Ends cutting 1/16" oversize to allow for RESURFACING
- **BUY AND SHARPEN 1 BLADE INSTEAD OF 3**

5/8" holes, boring thru 1-1/4" add $7.50. Larger at Time Basis —Shipping $4.50

WOODWORKER II	LIST	SALE	10%	20%
14"X40TX1"	$215	$149	$134	$119
14"X30TX1"	$195	$139	$125	$111
12"X40TX1"	$183	$129	$116	$103
12"X30TX1"	$162	$119	$107	$ 95
10"X40TX1/8" or 3/32"	$156	$119	$107	$ 95
30T 1/8" or 3/32"	$135	$ 99	$ 89	$ 79
9"X40T	$146	$109	$ 98	$ 87
30T	$125	$ 99	$ 89	$ 79
*8-1/4"X40TX 3/32"	$136	$ 99	$ 89	$ 79
8"X40T 3/32"	$136	$ 99	$ 89	$ 79
30T	$115	$ 89	$ 80	$ 71
7-1/4"X30T 3/32"	$112	$ 69	$ 62	$ 55
**6"X40T 3/32"	$136	$ 89	$ 80	$ 71

*NEW for Sears & Makita Table Saws **New For Saw Boss

$21 VALUE — FREE 10" ORANGE PLASTIC BLADE RUNNER-CARRIER!

SHIPPED WITH 6", 8" & 10" DADO SETS. HOLDS UP TO 10 BLADES, 5 PER SIDE ON CENTER BOLT OR DADOS.

DELUXE DADO-KING!

AS LOW AS $184 NET AFTER USING SHARPENING COUPONS

WORLD'S NO. 1 DADO - NO CHIP ON PLYS & MELAMINE

C-4 Carbide Tips — 4 on each chipper with special negative face hooks. Shims & 3/32" Chipper. Cuts 1/8" to 29/32" wide!

	LIST	SALE	10%	15%
6" D. 5/8" Bore NEW	$299	$269	$242	$229
8" D. 5/8" Bore	$321	$289	$260	$245
10" D. 5/8" & 1" Bore	$389	$349	$314	$297
12" D. 1" Bore	$499	$449	$404	$382

(Bore up to 1-1/4" Add $25 — Plus $5.50 S&H)

CHOPMASTER FOR SLIDING COMPOUNDS & MITER SAWS

New specs, 5° Neg. Pts. & flat, runs out less than .002 for perfect, tight, smooth, splinter-free miter joints.

TAKE EXTRA 10% – 20% OFF COMBO SALE!

NEW SIZES AVAILABLE	LIST	SALE
Delta Sidekick 6-1/2"x40Tx5/8"	$149	$ 89
Sears 8-1/4" & Delta 8-1/4"x60Tx5/8"	$170	$ 99
Hitachi 8-1/2"x60Tx5/8"	$179	$109
DeWalt 8-1/2" & Ryobi 8-1/2"x60Tx6/8"	$179	$109
Delta 9"x80Tx5/8"	$204	$119
Ryobi–Makita & all 10"x80Tx5/8"	$207	$129
DeWalt, Makita, B&D, Hitachi 12"x80Tx1"	$229	$139
Ryobi–Makita 14"x100Tx1"	$266	$179
Hitachi 15"x100Tx1"	$277	$189

For good general purpose cuts use Woodworker II 30T & 40T or Woodworker I. Use small stiffener where possible.

THE ONE BLADE THAT LEAVES A SMOOTH-AS-SANDED SURFACE!

SAVE ANOTHER $45 to $90 AFTER USING SHARPENING COUPONS

WOODWORKER I – CROSSCUT — 7 1/4" – 14"

For TABLE and RADIAL SAW – 10% to 20%

NON-SPLINTERING PLYS	LIST	SALE
14"x60Tx1"	$224	$159
12"x60Tx1" or 5/8" 1/8"K	$198	$139
10"x60Tx5/8" 3/32"K	$162	$129
8-1/4"X60T	$150	$109
8"X60T	$150	$109
7-1/4"X60T	$150	$109

OTHER SIZES AVAILABLE – 7 1/4" – 14"

CUTTING PROBLEMS?

Call the factory for *FREE* technical help!!

1-800-733-7111

201-473-5236

FLASH NEWS!!

OUR $79 - $89 30T & 40T OUTPERFORMED (E-XCELLENT) 23 other 40T & 50T premium blades both foreign & domestic on Ply, Melamine, MDF and Oak/Rip!

Editors' Choice and Top Rating over 18 competing combo saw blades!

"The 10"×40T earns our Editors' Choice award for the best performance, regardless of price. The 10"×40T produced super-smooth ripped edges in ¾ in. pine and oak, with absolutely no saw marks visible to the eye . . . we also got excellent crosscuts, surpassed only by an 80-tooth dedicated crosscut blade."

See *American Woodworker* April 1998, pp. 64-69.

DURALINE HI-A/T FOR TABLE & RADIAL SAWS

PORTABLE & PANEL SAWS

5/8" HOLES. Boring up to 1-1/4" $7.50 extra. Larger holes-time basis. Shipping $4.50.

TAKE 10% TO 20% MORE OFF THESE PRICES

Faster feed rates & absolute splinter control. Stops splintering on OAK/BIRCH PLY VENEERS & MELAMINE

SIZES AVAILABLE	LIST	SALE
7-1/4"×60T×3/32" K	$149	$129
8"×80T×1/8" & 3/32" K	$202	$169
220mm×80T×1/8" & 30mm	---	$167
9"×80T×1/8" & 3/32" K	$207	$179
10"×80T×1/8" & 3/32" K	$207	$159
12"×80T×1-1/8" K	$212	$181

SIZES AVAILABLE	LIST	SALE
300mm×100T×1/8"×30mm	---	$197
12"×100T×1-1/8" K	$253	$215
14"×80T×1"	$232	$197
14"×80T×1"	$266	$226
16"×100T×1"	$262	$223
16"×100T×1"	$294	$249

SPECIAL COMBO SALE EXTRA 10%-20% OFF

Above 1" bore standard.

CARBIDE IS THE HARDEST OF THE C-4 GRADES AND 40% STRONGER, NOT WEAKER! FOR 50% TO 300% LONGER LIFE.

Standard C-2 Carbide (below, left) and FORREST still sharp Oxidation and Corrosion Resistant Sub-Micron C-4 Carbide (below, right). Each shown after cutting 3,500 feet of MDF. Similar results obtained cutting particle board, melamine, and plywood.

STILL SHARP AFTER 3,500 FEET OF CUTTING!

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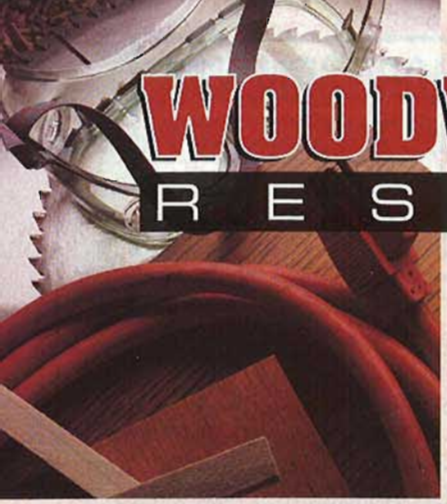

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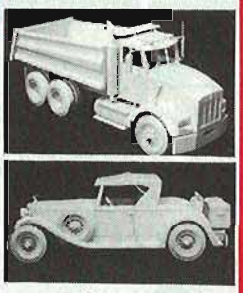

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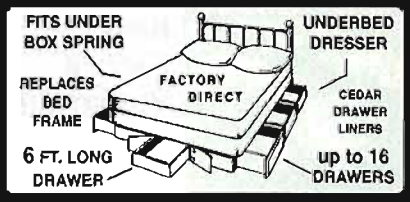

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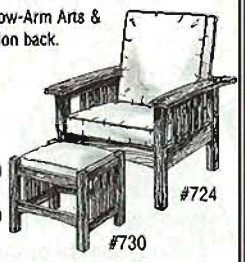

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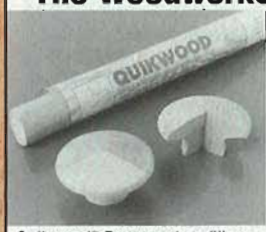

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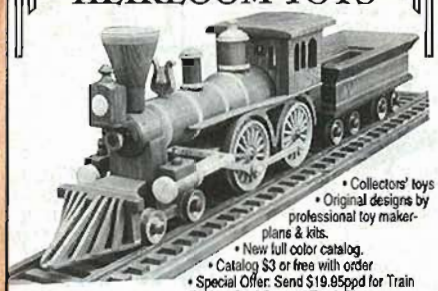

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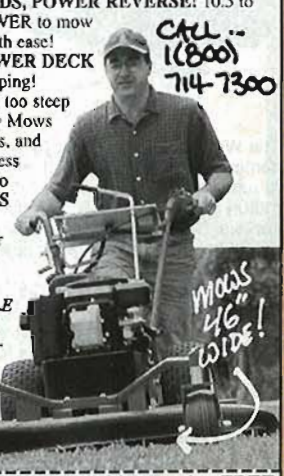

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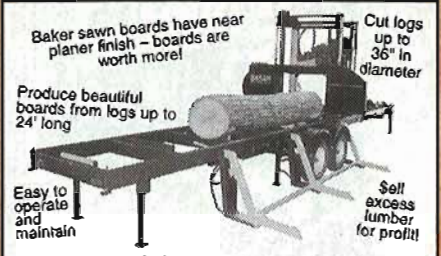
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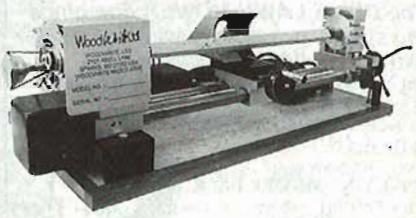

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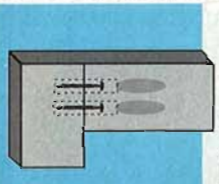

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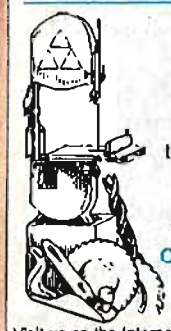

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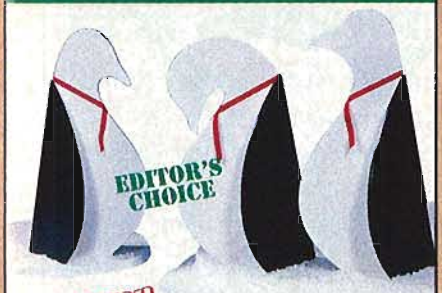

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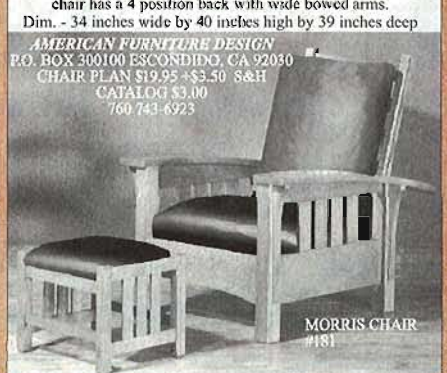

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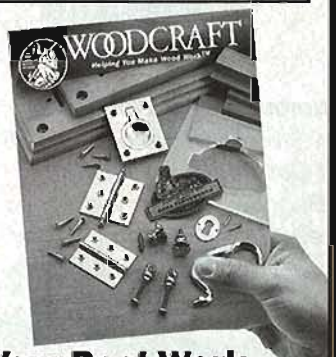

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PRODUCTS THAT PERFORM — SHOP TESTED

Continued from page 82

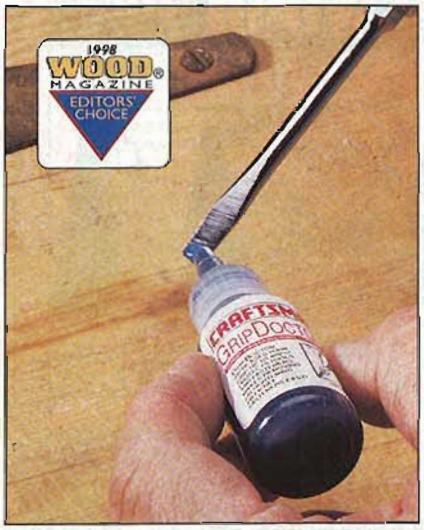
Gritty compound gives screwdriver greater grip

Stick a screwdriver tip into the slot of a rusty screw you want to remove from a piece of hardwood, and you have the makings of an ugly workshop episode. All too often the screwdriver tip slips out of the slot, chewing up the screw head and making removal even more difficult.

Craftsman GripDoctor goes a long way toward preventing such hardware horror. Applied to the tip of your screwdriver or the screw head, the thick, gritty liquid gives the blade enough traction against the sides of the screw slot to resist cam-out. In our tests, GripDoctor also proved useful in turning worn bolt heads or nuts with an open-end wrench.

If you repair or restore old furniture, live in an old house, or just seem to encounter a lot of situations where you need to apply a lot of torque to a screw head, you'll want to keep a tube of Grip Doctor nearby whenever you pick up a screwdriver.

–Tested by Randy Zimmerman



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Value	★ ★ ★ ★ ★

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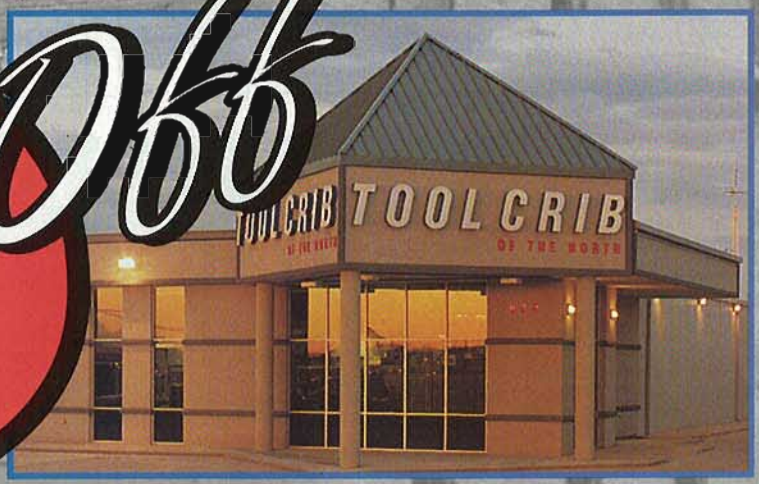

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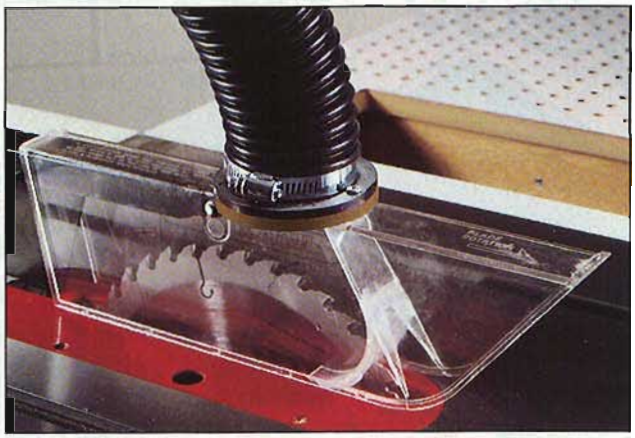
Circle No. 15

GREAT IDEAS FOR YOUR SHOP

Saw-Top Dust Collector

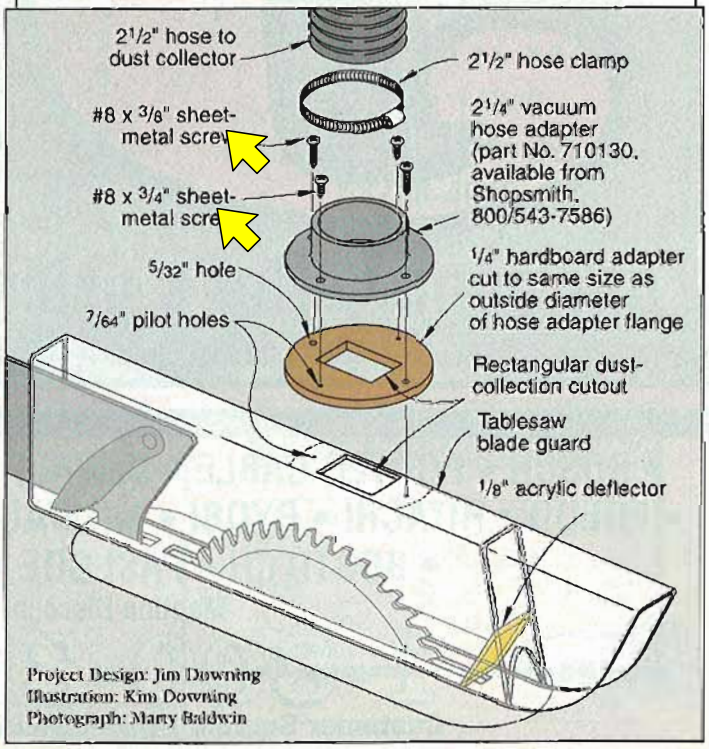
Catch the dust before it falls



Two of our favorite topics in the *WOOD*® magazine shop are dust collection and safety, and this nifty apparatus combines both. It works so well you'll never want to remove the blade guard again.

Dust and chips thrown forward from the saw blade bounce off the acrylic deflector and get pulled into the flexible vacuum hose. Hang the hose directly above the blade and connect it to your shop vacuum or dust-collection system.

Seal the joint between the blade guard and the hardboard adapter with a bead of silicone sealant. Hold the acrylic deflector in place with silicone sealant or acrylic adhesive.


2½" hose to dust collector
2½" hose clamp
#8 x 3/8" sheet-metal screw
2¼" vacuum hose adapter (part No. 710130, available from Shopsmith, 800/543-7586)
#8 x 3/4" sheet-metal screw
5/32" hole
1/4" hardboard adapter cut to same size as outside diameter of hose adapter flange
7/64" pilot holes
Rectangular dust-collection cutout
Tablesaw blade guard
1/8" acrylic deflector

Project Design: Jim Downing
Illustration: Kim Downing
Photograph: Marty Baldwin

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Optional powerfeed: Yes

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Vertical lift: Lift by hand
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Tool mount: Setscrew
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40-560	16" 2 speed Scroll Saw	330	155
40-540	16" var/spd Scroll Saw	249	179
11-990	12" Bench Drill Press	255	184
11-090	32" Radial Bench Drill Press	405	279
43-505	1/2" Bench Router/Shaper	398	299
22-540	12" Bench Top Planer	Sale	329
28-195	10" Band Saw	390	309
22-560	12-1/2" Bench top Planer		395
36-885	Versa Feeder Stock Feeder		249
36-220	10" Compound Mitre Saw	294	199
28-185	Bench Band Saw	213	169
36-240	NEW 10" Sliding Compound Mitre Saw	589	439
37-070	6" v/spd Bench Jointer	351	265
14-650	Hollow Chisel Mortiser	380	239
33-990	10" Radial Arm Saw	881	799
36-905	30" Unifence	348	255
36-906	50" Unifence	444	325
17-900	16-1/2" Floor Drill Press	490	399
37-190	6" Deluxe Jointer	603	445
36-285	8-1/4" Builders Saw w/ stand	Sale	268
36-210	10" Compound Mitre Saw	344	219
34-555	Sliding Table	487	289
36-250	10" Slide Compound Saw	625	489
31-780	Oscillating Spindle Sander	253	194
46-700	12" Wood Lathe	575	465
34-444	10" Contractors Table Saw	Sale	615
34-445	10" Contractors Table Saw with 30" unifence	Sale	839
28-275	14" Band Saw 3/4 HP	Sale	595
28-280	14" Band Saw 1 HP motor with enclosed stand	Sale	739
28-280Z	14" Band Saw 1 HP w/ 50-274 mobile base, 28-843 rip fence, & 28-266 cool blocks	Sale	839
40-650	Q3 18" Scroll Saw	Sale	479
22-675	DC380 15" Planer	Sale	1175
31-280	Sanding Center w/ stand	Sale	789

NEW Single Stage Dust Collectors

50-840	1 HP, 650 CFM	270	225
50-850	1-1/2 HP, 1200 CFM	Sale	309
50-851	2 HP, 1500 CFM	Sale	455

MILWAUKEE TOOLS

6527	NEW Sawzall with case	343	169
6537-2	6527 w/quick lok blade change	224	175
0407-22	12V Drill w/kys chuck & 2 batt	380	175
0224-1	3/8" Drill 4.5 amp magnum	236	132
0234-1	1/2" Drill 4.5A mag 0-850 rpm	255	134
0235-1	1/2" Drill w/keyless chuck	255	142
0244-1	1/2" Drill 4.5A mag 0-600 rpm	255	134
0222-1	3/8" Drill 3.5 amp 0-1000 rpm	213	119
0228-1	3/8" Drill 3.5 amp 0-1000 rpm	207	109
0375-1	3/8" close quarter Drill	255	148
0379-1	1/2" close quarter Drill	288	165
6546-1	cdls Screwdvr 200 & 400 rpm	150	89
6547-1	6546-1 w/bits, 1/4" chuck & cs	185	109
5399	1/2" D-hdle Hammer Drill Kit	356	219
5397-1	3.8" v/ spd Hammer Drill Kit	275	145
5371-1	1/2" v/ spd Hammer Drill Kit	360	194
3107-1	1/2" v/spd right angle Drill Kit	411	234
3300-1	1/2" v/ spd right angle Drill	378	219
6142	4-1/2" Grinder w/case & acc.	224	129
6490	10" Mitre Saw	496	265
6491	6490 w/ carbide blade & bag	594	328
6494	10" Compound Mitre Saw	585	315
6266-6	Top Handle Jig Saw	315	159
6496	10" Slide Compound Saw	1050	569

FREUD CARBIDE TIPPED SAW BLADES
5/8" Bore - Industrial Grade

Item	Description	Teeth	List	Sale
LU72M010	Gen Pur. A.T.B.	10" 40	69	42
LU82M010	Cut-off	10" 60	93	44
LU84M011	Comb	10" 50	78	45
LU85M010	Super Cut-off	10" 80	115	59
LM72M010	Ripping	10" 24	69	38
LU73M010	Cut off	10" 60	84	49
LU87M010	Thin Kerf	10" 24	72	45
LU88M010	Thin Kerf	10" 60	88	49
LU98M010	Ultimate	10" 80	128	68
LU91M010	Compnd Mitre	10" 60	88	54
F410	Quiet Blade	10" 40	95	49
TK303	7-1/4" Finishing	40	38	25
SD308	8" Dado - Carbide		230	119
SD508	8" carbide w/case & shims		344	168
FB100	16 piece Forstner Bit Set		338	194
94-100	5 pc. Router Bit Door System		320	169
FT2000E	Plunge Router		Sale	205
FJ85	Top Hdl Jig Saw		Sale	99
JS102	Biscuit Jointer		Sale	125
TR215	8-1/4" Mitre Saw		Sale	249

HITACHI TOOLS

C8FB2	8-1/2" Slide Compound Saw	1169	449
C10FS	10" Slide Compound Saw	1627	699
C15FB	15" Mitre Saw	1346	645
NV45AB	Coil Roofing Nailer	935	379
C10RA	NEW 10" Table Saw	632	319

MAKITA TOOLS

Model	Description	List	Sale
5090DW	3-3/8" Saw Kit 9.6 volt	280	155
DA391D	3/8 angle Drill 9.6V	168	114
DA391DW	3/8" angle Drill Kit 9.6V	341	189
ML900	Incandescent Flashlight 9.6V		14.95
6095DWE	9.6 volt Drill Kit w/2 batt	Sale	125
6095DWLE2	6095DWE w/flashlight	Sale	139
6095D	6095DW Drill only & case	Special	65
632007-4	9.6 volt Battery	47	30
632002-4	7.2 volt Battery	39	28
6203DWAE	9.6V 3/8" Drill Kit w/2 batt	351	159
6211DWHE	12V 3/8" Drill Kit w/2 batt	368	175

CORDLESS DRILLS
WITH 2.0 AMP HIGH CAPACITY BATTERIES

6213DWAE	12V 3/8" Drill Kit	325	169
6233DWAE	14.4V 3/8" Drill Kit	358	205
9900B	3"x21" Belt Sander w/bag	347	179
9924DB	3"x24" Belt Sander w/bag	360	199
JR3000V	v/ spd Recip Saw w/case	264	135
N1900B	3-1/4" Planer with case	283	142
1912B	4-3/8" Planer	352	199
N9514B	4" Disc Grinder 4.8 amp	116	65
DA3000R	3/8" Angle Drill	355	195
2706W	8-1/4" Table Saw	637	295
6405	3/8" Drill Rev. 0-2100 rpm.	115	65
6013BR	1/2" Drill Rev. 6 amp	270	159
9401	4" x 24" Belt Sander w/bag	458	235
5007NBK	7-1/4" Circ Saw w/ case	260	125
LS1011	10" Slide Compound Saw	995	429
LS1211	12" Slide Compound Saw	1620	729
3901	Plate Joiner Kit	376	209
3612C	3 HP Plunge Router	492	269
LS1040	10" Cmpnd Miter Saw	460	259
LS1013	10" Dual Compound Slide Miter Saw	1086	599
BO5010	5" Random Orbit Sander with dust pickup	142	72
LS1220	NEW 12" Compound Miter Saw		379

SENCO AIR NAILERS

SFN1+	Finishing Nailer 1" - 2" w/ cs	448	299
SN325	Nailer 1-7/8" - 3-1/4"	665	365
SLP20	Pinner w/cs 5/8 -1-5/8"	422	229
SKS	Stapler 5/8" - 1-1/2"	390	279
SN70	Framing -Clip Hd 2"-3-1/2"	725	449
SN65	Framing -Full Hd 2"-3-1/2"	709	389
SFN40	Finish Nailer 1-1/4 - 2-1/2	569	349

BOSTITCH AIR NAILERS

Model	Description	List	Sale
N80S-1	Stick Nailer	Super Sale	339
RN45	Coil Roof Nailer 3/4 - 1-3/4	845	369
N80FN-2K	Finishing Nailer w/ case	557	275
BT35-2K	Brad Tacker 5/8" - 1-3/8" with case, oil, & brads	279	125
CWC100	1 HP Pancake Compressor	440	305
MIIIFS	Flooring Stapler 15 gauge	902	529
S32SX-1K	Finish Stapler-1/2" - 1-3/8" with case & oil	269	145

JORGENSEN ADJUSTABLE HANDSCREWS

Item#	Jaw Length	Opening Capacity	List	Sale	Box of 6
#0	6"	4-1/2"	20.35	12.10	66.95
#1	10"	6"	23.30	12.90	71.85
#2	12"	8-1/2"	26.75	14.90	83.95
#3	14"	10"	33.85	18.55	105.75

PONY CLAMP FIXTURES

Model	Description	List	Sale	Lots of 12
50	3/4" Black Pipe	15.45	8.50	92.50
52	1/2" Black Pipe	12.65	6.95	74.95

PANASONIC CORDLESS

EY6100FQKW	12V 3/8" Drill kit w/ 2 Ironman batteries, 15 min. charger, & case	379	179
EY6101FQKW	12V 1/2" Drill w/ 2 Ironman batteries, 15 min. charger, & case	324	199
EY6230FQKW	NEW 15.6V Drill Kit with 2 Ironman batteries, 30 minute charger & case	425	215
	Batteries for above are NEW 2.0 amp-hr		
EY3503FQWKW	NEW 5-3/8" 12V Wood Cutting Saw Kit	600	259

BIESEMEYER FENCES

B-50	50" Commer. Saw	443	325
T-SQUARE 52	52" Homeshop	360	275
T-SQUARE 40	40" Homeshop	335	255
T-SQUARE 28	28" Homeshop	325	245

RECORD WOODWORKING VISES

Model	Jaw Width	Opening	List	Sale
53E	10-1/2"x15"	Quick release	248	125
52D	7"x8"	Quick release with dog	169	85
52-1/2D	9"x13"	Quick release with dog	231	99

SIOUX TOOLS

8030	3/8" var/spd Drill	263	165
8000	3/8" var/spd close qtr Drill	211	135
890	5" Air Random Orbit Sander	228	139
790VV	5" Sander w/ Venturi vacuum	313	179

STABILA LEVELS

25010	10" die cast Torpedo Level	43	29
21990	10" Torpedo Level	Sale	13.95
24840	24" Level w/ hand holes	62.20	43
24870	48" Level w/ hand holes	79.70	55
24610	48" Level w/ angle setter vial	80	59

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DEWALT TOOLS

Model	Description	List	Sale
DW222	3/8" Drill, 0-1200 rpm, 6.7 amp	184	99
DW231	1/2" Drill, 0-850 rpm, 7.0 amp	240	129
DW236	1/2" Drill, 0-850 rpm, 7.8 amp with keyless chuck	264	149
DW124K	1/2" right angle Drill	590	339
DW321K	Top Handle Jigsaw Kit	300	164
DW364	7-1/4" Circ. Saw w/brake	294	162
DW610	1-1/2 HP 2 handle Router	266	152
DW411K	1/4 sheet Palm Sander w/ case	88	58
DW682K	Biscuit Joiner with case	448	199
DW705	12" Compound Mitre Saw	734	359
DW625	3 HP v/ spd Plunge Router	Sale	279
	DW625 router comes with DW6913 edge guide !		
DW621	2 HP Plunge Router	400	218
	DW621 comes with Free DW6956 fine height adjuster !		
DW675K	9-1/8" Planer with case	292	164
DW677K	NEW 3-1/4" Planer w/ case	268	155
DW431	3 x 21 v/spd Belt Sander	338	189
DW421	5" Palm Ran. Orb Sander	144	74
DW423	Palmgrip Random Orbit Sander - variable speed	170	94
	DW421 & DW423 come with Free DW4317 case !		
DW673K	Laminate Trimmer Kit	364	169
DW272	Drywall Gun, 0-4000, 6.3 amp	160	95
DW276	Drywall Gun, 0-2600, 6.5 amp	160	95
DW935K	14.4V 5-3/8" Trim Saw Kit	484	237

DEWALT CORDLESS DRILLS

DW952K-2	3/8" v/spd w/ two 9.6V XR batteries	284	129
DW972K-2	3/8" variable speed w/ two 12V XR batteries	362	182
DW972KQ-2	Above drill kit with 15 minute charger	Sale	229
DW904	12 volt flashlight		24.95
DW991K-2	3/8"variable speed w/ two 14.4V XR batteries	415	209
DW991KQ-2	Above drill kit with 15 minute charger	Sale	245
DW994KQ	1/2" variable speed w/ one 14.4V XR batteries	458	239
	Above drill kits come w/ charger & steel case !		
DW991KS-2	DW991K drill, DW935 trim saw, & case	Sale	345

DEWALT 18 VOLT CORDLESS TOOLS

DW938K	Recipro Saw Kit	520	269
DW995K	1/2" Drill Kit	428	228
DW997K	1/2" Drill/Hammer Drill Kit	454	249
DW936K	5-3/8" Saw Kit	458	249
DW995KS-2	DW995K Drill, DW936 Saw and case	Sale	386
DW991KC-2	DW991K 14.4V drill kit, DW937 14.4V recipro saw,& case		375
DW995KC-2	DW995K 18V drill kit, DW938 18V recipro saw, & case		395
DW987KC-2	DW997K 18V drill kit, DW938 18V recipro saw, & case		415

DEWALT BENCH TOP TOOLS

DW708	12" Dual Compound Slide Mitre Saw	Sale	649
DW788	20" Scroll Saw	Sale	469
DW733	12" Planer	Sale	435
DW744	10" Portable Table Saw	Sale	499
DW756	NEW 6" Bench Grinder	164	75
DW758	NEW 8" Bench Grinder	184	115

BOSCH

Model	Description	List	Sale
1587VS	Top Handle "CLIC" Jig Saw	292	139
1587AVSC	1587VS 50th Anniversary saw with case	Sale	149
1584VS	Barrel "CLIC" Jig Saw	288	139
Bosch Metal Case for above Jig Saws			24
Bosch 30 blade assortment for Jig Saws			28.99
	1584VS or 1587VS with steel case and 30 Bosch blades	Sale	175
1295DH	5" Random Orb Palm Sndr	145	89
1274DVS	3"x21" v/spd Belt Sander	301	175
1276D	4"x24" Belt Sander	379	219
1276VSK	1-1/2"x12" Belt Sander	218	129
1276DVS	3"x24" v/s Belt Sndr	379	214
1276DVS	4"x24" v/s Belt Sndr	408	229
1347AK	4-1/2" Grinder w/cs & acc.	172	89
1194VSR	1/2" v/ spd Hammer Drill	272	155
1194VSRK	above Drill w/ case	303	169
1604A	1-3/4 HP 2 Handle Router	269	142
1613EVS	2HP v/s Plunge Router	369	199
1616EVS	3 HP v/s Plunge Router	538	305
1634VSK	Recip Saw 10.5 amp	335	185
3315K	12V T-handle Drill Kit	345	159
3615K	14.4V Drill Kit	354	174
3107DVS	5" Random Orbit Sander	165	98
3107DVSK	3107DVS with case	195	115
3725DVS	5" Random Orbit Sander	256	149
3727DVS	6" Random Orbit Sander	266	154
B3915	10" Slide Compound Saw	1050	559
1224VSR	7/8" SDS Rotary Drill	404	229
1703AEVS	5" Grinder - 8.5 amp	245	139

Introducing the NEW Bosch Routers

1617	1-3/4 HP Router - 2 handle	
1617EVS	2 HP Router w/ variable speed - 2 handle	
1618	1-3/4 HP Router - "D" handle	
	Call for special pricing on above routers	

PORTA NAILER

401	Porta Nailer complete	295	209
501	Face Nailer complete	295	209

DAVID WHITE

LP6-20	Sight Level package - 20x	329	215
LP6-20XL	LP6-20 w/9056 tripod & 7620 rod	289	
LT8-300	Level Transit - 26x	739	489
LT8-300P	above Level w/ optical plum	869	569
LT6-900	Level Transit - 20x	419	279
ALT6-900A	Auto Level - Transit -18x	688	456
ALTP6-900	above Level with tripod & rod	799	525
AL8-22S	Automatic Level - 22x	583	295
AL8-26S	Automatic Level - 26x	854	325

JET TOOLS

JJ60S	6" Jointer - open stand	Sale	429
JJ6CSX	6" Jointer - closed stand	Sale	489
JJ8CS	8" Jointer - closed stand	Sale	1189
JWP12P	12" Benchtop Planer	Sale	339
JWBS14OS	14" Band Saw 3/4 HP - open stand	Sale	499
JWBS14CS	14" Band Saw 1 HP - closed stand	Sale	579
JWTS10JF	10" Contractor Table Saw with 80" Jet fence 1-1/2 HP	Sale	599
JWTS10CWPF	10" Contractor Table Saw with 30" Exacta fence 1-1/2 HP	Sale	749
JTAS10XS01	10" Tilting Arbor Table Saw with 50" Exacta fence - 3 HP	Sale	1399
JDP17MF	16-1/2" Drill Press 3/4 HP - 16 speed	Sale	429
DC-650	Dust Collector, 1 HP, 650 CFM	319	219
JWP-15HO	15" Planer with stand and casters	1699	1229

PORTER CABLE

9444	Profile Sander Kit	220	99
9444VS	Var/spd Profile Sander Kit	207	115
690	1-1/2 HP Router 8 amp	279	149
6931	Plunge Router Base	139	82
693PK	690 and 6931 plus case	Sale	199
691	1-1/2 HP Router D-handle	303	164
693	1-1/2 HP Plunge Router Base	336	184
697	1-1/2 HP Router/Shaper	418	235
698	Heavy Duty Shaper Table	238	135
352VS	3x21 v/s Belt Sander w/bag	321	175
360	3"x24" Belt Sander w/ bag	397	214
360VS	360 Sander w/ variable speed	429	229
362	4"x24" Belt Sander w/ bag	412	224
362VS	362 Sander w/ variable speed	446	239
9125	3-1/4" Planer Kit w/ case	250	145
9118	Porta Plane Kit 7 amp	400	235
505	1/2 sheet Pad Sander	249	139
97549	Top handle Jig Saw 4.8 amp w/ case & blades	275	144
330	Speed Block Sander 1/4 sheet	120	69
556	Biscuit joiner w/5556 fence	Sale	135
557	NEW Plate Jointer with tilt fence. Includes 2" & 4" blades for use with standard & face frame plates	400	215
9647	TIGER CUB Recip. Saw	230	134
9637	Full var/spd Recip Saw 8 amp	276	148
7519	3-1/4 HP Router 2 Handle	469	258
7518	3-1/4 HP 5 speed Router	534	289
7539	3-1/4HP v/spd Plunge Router	534	289
7310	5.6 amp Laminate Trimmer	178	102
97310	Laminate Trimmer Kit comp	336	189
7335	5" Random Orbit Sander	254	139
97355	7335 w/ case & dust pick-up	274	149
7336	6" Random Orbit Sander	259	145
97366	7336 w/ case & dust pick-up	284	159
332	Palm Grip Rndm Orb Sander	133	59
333	above sander with dust bag	148	65
333VS	NEW Random Orbit Sander - variable speed	150	79
334	333 Sander with PSA pad	148	65
335	NEW Palmgrip Random Orbit Sander with dual flip pad	Sale	85
310	Production Lam. Trimmer	270	154
347K	7-1/4" "Framers" Circ Saw with plastic case	250	129
743K	7-1/4" "Framers" Circ Saw with case - left hand version	250	129
9737	Tiger Recipro Saw	307	158

New Porter Cable Cordless Nailers !

CDA250	Angle Finish Nailer 1-1/4" to 2-1/2"	500	279
CFN250	Finish Nailer 1" to 2-1/2"	500	279
CMS200	Medium Crown Stapler 1" to 2"	500	279

Porter Cable Pneumatic Nailers

BN125	Brad Nailer - 18 ga. 5/8"- 1-1/4"	144	69
BN200	Brad Nailer - 18 ga. 3/4"-2"	238	139
FN250A	Finish Nailer - 16 ga. 1"-2-1/2"	362	189
DA250A	Nailer - 15 ga. 1-1/4"-1-1/2"	412	235
FC350	Framing Nailer - clipped head	558	289
FR350	Framing Nailer - round head	558	288
BN175	NEW Roofing Coil Nailer	504	289

Porter Cable Compressors

CF1400	1 HP, 4 gal. Pancake	Sale	195
CF1540	1-1/2 HP, 4 gallon Side Stack	Sale	295
CF2400	2 HP, 4 gal. Side Stack	Sale	319

Porter Cable Cordless Drills

9862	12V Drill Kit w/ 2 batteries	382	169
9862F	9862 Drill Kit with flashlight	Sale	189
9872	14.4V Drill Kit w/ 2 batteries	424	205

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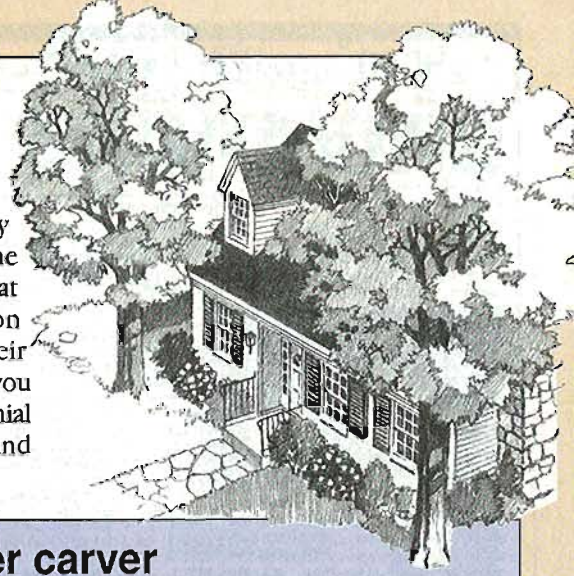
In New England, trees once were married

In his renowned book, *A Reverence for Wood*, author Eric Sloane cites the fact that in the early days of the nation, people living in Connecticut's Berkshire Hills cleared the land of hardwood trees about every 35 years. This "coaling," as it was called, provided wood for charcoal to fire the area's many iron furnaces. After such a clearing, the only trees to be seen for miles were the large "husband and wife" trees that farmers traditionally planted on each side of the entrance to their newly built homes. Even today, you can spot some of these matrimonial landmarks across the New England landscape.



Get some low-cost help identifying trees

What can you buy for three bucks these days that's educational as well as enjoyable? In most places, not even a ticket to the movies. The National Arbor Day Foundation, however, has a super deal that you can really use—if you're into wood and the trees it comes from.

For $3 postage-paid, you can buy an easy-to-use, pocket-size tree identification booklet. Choose either *What Tree Is That? A guide to the more common trees found in the Eastern and Central U.S.* (72 pages), or *What Tree Is That? A guide to the more common trees found in the Western U.S.* (84 pages). Each is a comprehensive field guide that uses leaf, flower, fruit, and twig characteristics, among other things, to help you tell which tree is which. Order the one that covers the area where you live. If you travel a lot, order both ($6 ppd.). Send your check or money order to The National Arbor Day Foundation, 100 Arbor Ave., Nebraska City, NE 68410.

Photographs: Carving, Jack A. Williams; Hetherington Photography
Illustration: Jim Stevenson

Dollywood's master carver

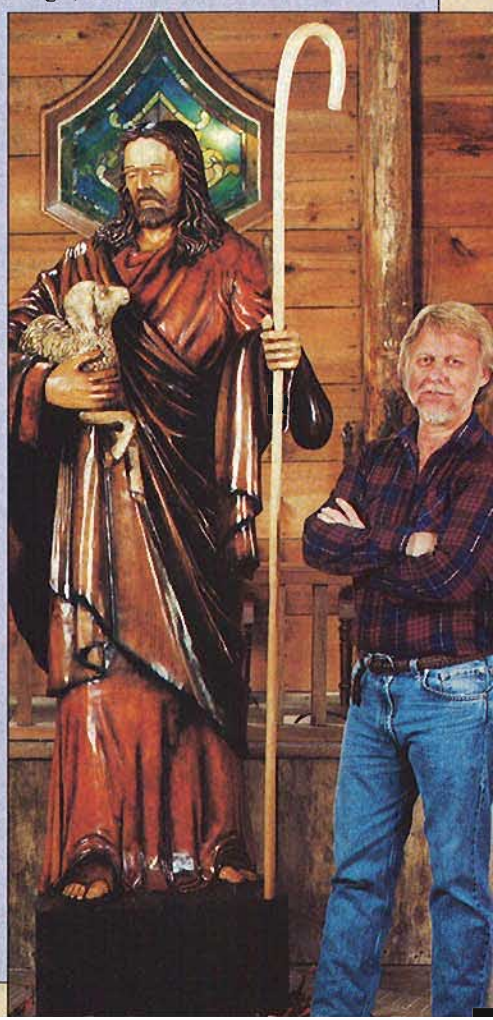
You don't have to be a woodcarver to enjoy watching Lee Warren at work. He's the master carver at Dollywood Entertainment Park in Pigeon Forge, Tennessee. And for six months of the year, park visitors get to see him carve while listening to his tales of carving history and explanation of techniques as he employs them.

Lee, 56, wasn't born with a carving knife in hand. In fact, he was a movie stunt man before he took up carving in 1977. But since 1982, he's been at it full-time, learning as he worked. He even spent 1990 in Austria and Switzerland studying traditional European Nativity carving.

At Dollywood, Lee has taken on a number of challenges. He replicated several of the animals featured on the park's turn-of-the-century Dentzel carousel, and sold one horse for $10,000. And he has become adept at creating cigar-store Indians, now his trademark.

His most challenging project to date, though, is "Jesus, the Good Shepherd," shown *right*, one result of his European study. The 7'-tall (with base) figure cradling a lamb took him two seasons to complete. "That's because in a 10-hour day, I'll spend seven hours talking," he laughs. Carved from laminated basswood blocks that totaled over 700 pounds and colored with oil stains, it (and two child figures in progress at press time) will occupy a commanding spot outside the park's Robert F. Thomas Church.

Visit Lee and see him and others demonstrate in Craftsmen's Valley during October, which is Crafts Festival month at the park. Dollywood is open May through October. Call 800/DOLLYWOOD. Or write Dollywood Information, 1020 Dollywood Lane, Pigeon Forge, TN 37863-4101.



Lee Warren's carving "Jesus, the Good Shepherd" was done using only a mallet and chisels. He carved it in front of visitors over two seasons at Dollywood Entertainment Park in Tennessee.

MITER STOPS THAT MAKE FINISH WORK AS EASY AS PAINT BY NUMBERS.

As anybody knows, getting the right measurement is key to making a precise cut. That's why the stops on the Craftsman Compound Miter Saw are color-coded for crown molding, rafter and miter cuts. If you want to know more, like the fact it packs a 12" carbide-tipped blade and powers up to 3.5 HP, go to our Web site at www.sears.com/craftsman. You'll find everything you need to finish any job with unflinching exactness.

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Make Elegant Pencrafting Projects In Minutes

For less than $5.00 and in just minutes you can make unique hand turned projects that sell for $20.00 and up. Our selection of lathe projects includes over eighty 24kt gold plated kits that are easy to turn and make wonderful gifts. Select from a wide assortment of pencrafting projects that includes: pens, pencils, keychains, letter openers, penlights, perfume applicators and more. Every pencrafting kit comes with detailed instructions, a lifetime guarantee and customer support from our knowledgeable staff.

NEW Carba-Tec 3XL Variable Speed Mini Lathe

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The perfect lathe for pencrafting and turning small projects. We're so confident of the reliability of this new lathe, we're offering a 3 year warranty! The new Carba-Tec 3XL is compact, portable, and can be used anywhere. With the purchase of the lathe you'll receive a FREE 35 minute instructional video "Turning Pens and Other Small Projects"- a $19.95 value! This informative video tape describes everything you need to know about making popular pencrafting kits.

Specifications

- Variable speed 1/4 HP motor
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- 3/4" x 16 tpi Spindle w/ #1 MT
- 12-1/2" between centers
- 6" swing over bed • Weighs 37 pounds

Includes extras worth $65:

- Video tape • toolrest • 4 prong spur center
- 2" faceplate • 2 belts • Live tailstock center w/ cup & point inserts

Carba-Tec 3XL Mini Lathe

#CML3XL Regular Price-$289.95 /SAVE $151 ....ONLY **$274.95** / UPS $19

Duplicating Attachment For Carba-Tec and Jet™ Lathes

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Turn your pencrafting projects more quickly, accurately, and easily. This ingenious and practical accessory will help you turn your work like a pro every time. It works like copying a key- just follow the pattern and you'll make a perfect turning. It duplicates from a hand cut pattern, 3-D original, or from PSI pre-cut Profile Templates. Template sets are available for many kits, including: "Slimline" 7mm pens and pencils, "Designer" Mont Blanc™ style twist pens and pencils, "Classic" Parker™ style twist pens, perfume pens, and perfume atomizers. The Duplicator Attachment fits all Carba-Tec and Jet™ style mini-lathes. Duplicates up to 10" long with a depth of cut up to 3/4". The cutter is HSS ground on both ends. Order now and receive a FREE instructional video, "Duplicating Attachment Projects and Techniques"- a $19.95 value!

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CARBA-TEC 3XL AND DUPLICATOR PACKAGE SAVE $25!
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PEN MAKING AND MINI LATHE
STARTER SETS
Carba-Tec 3XL Mini Lathe or Jet™ Mini Lathe

SAVE $40

- 7mm Drill Guide
- 1/2" Penmaking Gouge
- 7mm Pen Kits-Pk of 10
- 7mm Pencil Kits-Pk of 10
- "Pen Turning" Instructional Video
- Mandrel w/ bushings & drill bit
- Clear Pen Pouches - Pk of 20

#CML-SS Carba-Tec Set ... **$357.90** UPS $19
#JMINI-SS Jet Lathe Set ... **$413.85** UPS $29

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- Drill Guide • Long Mandrel
- Bushings • Drill Bit

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3/4" x 16 tpi mandrel kit
#PKSS-AL ..... **$75** SET
1" x 8 tpi mandrel kit
#PKSS-BL ..... **$75** SET
5/8" mandrel kit
#PKSS-CL ..... **$75** SET
3/8" drill chuck mandrel kit
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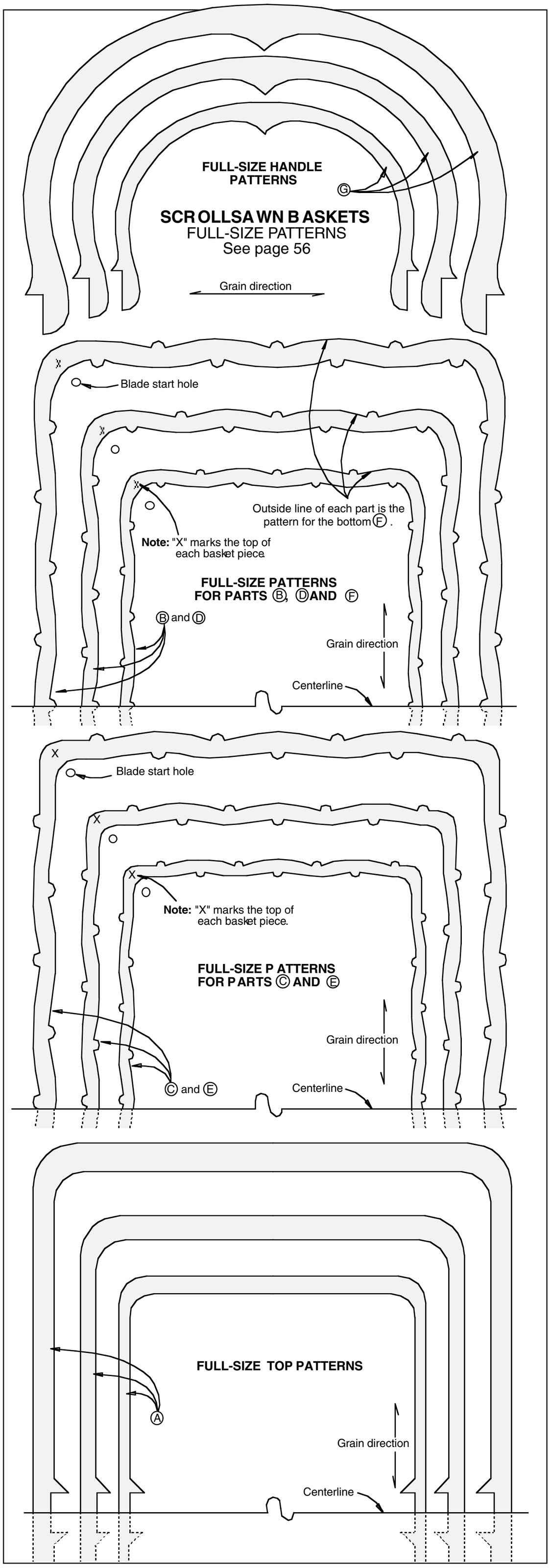

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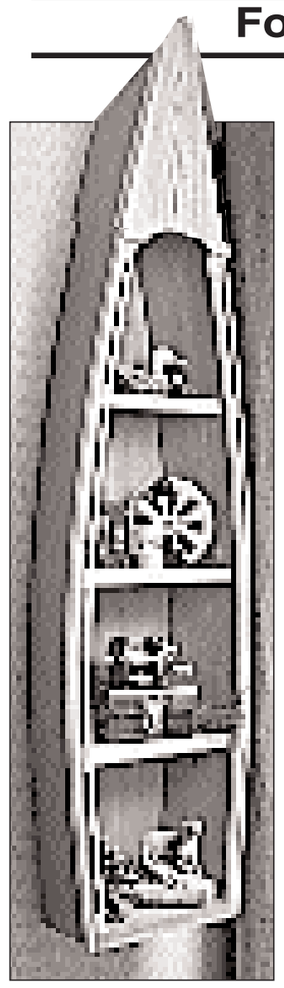

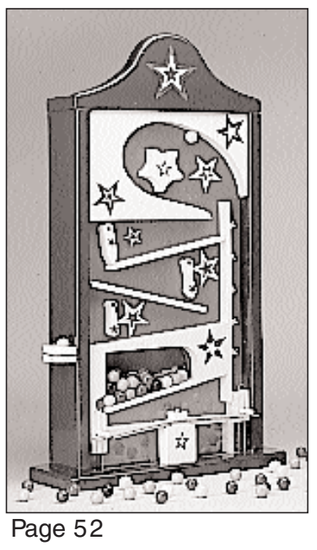

Page 52

Dear Reader: As a service to you, we've included full-sized patterns on this insert for irregular-shaped and intricate project parts. You can machine all other project parts using the Bill of Materials and the drawings accompanying the project you're building.

- **Nautical Shelf**
- **Scrollsawn Basket**
- **Gum ball Machine**

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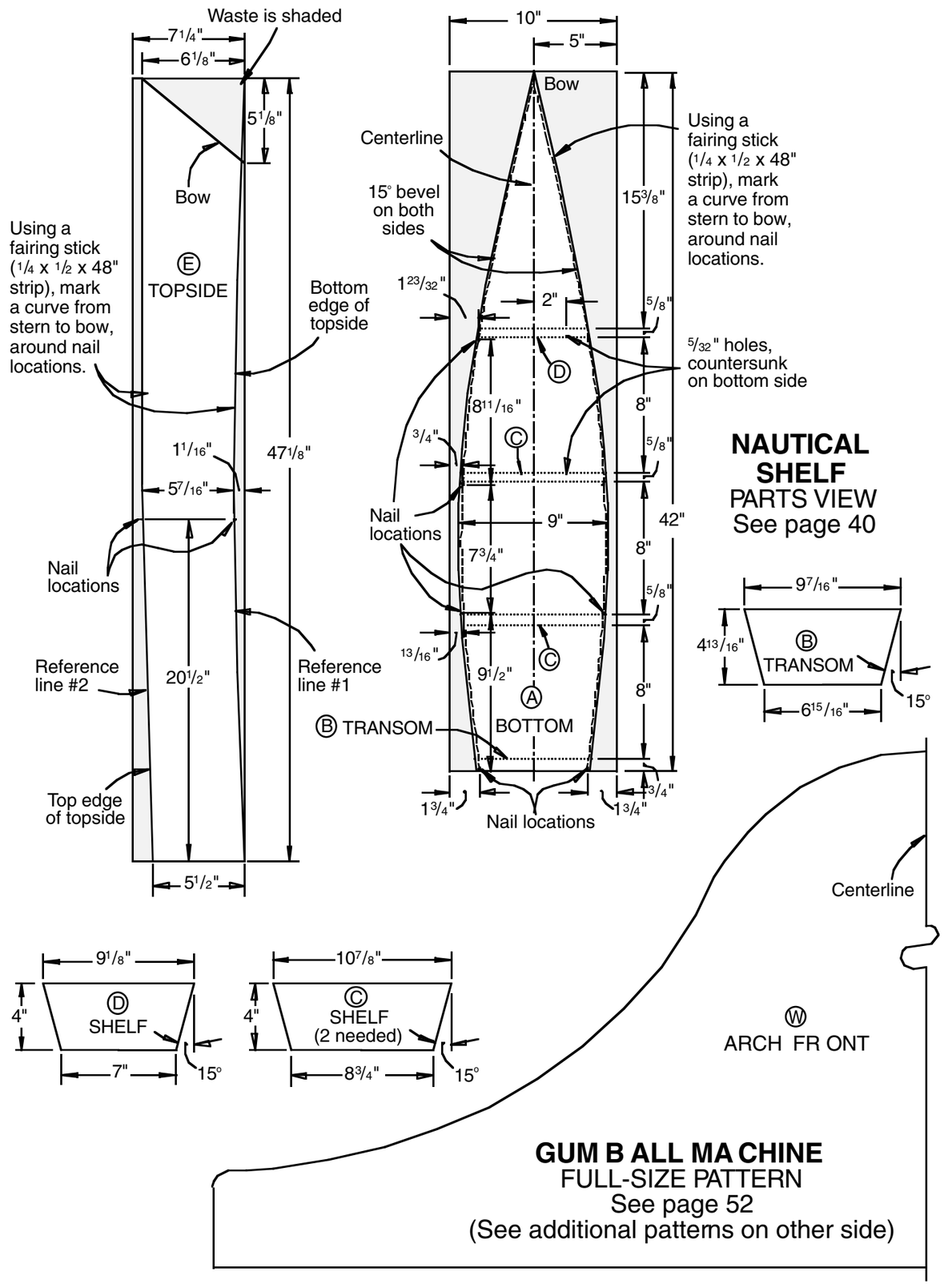
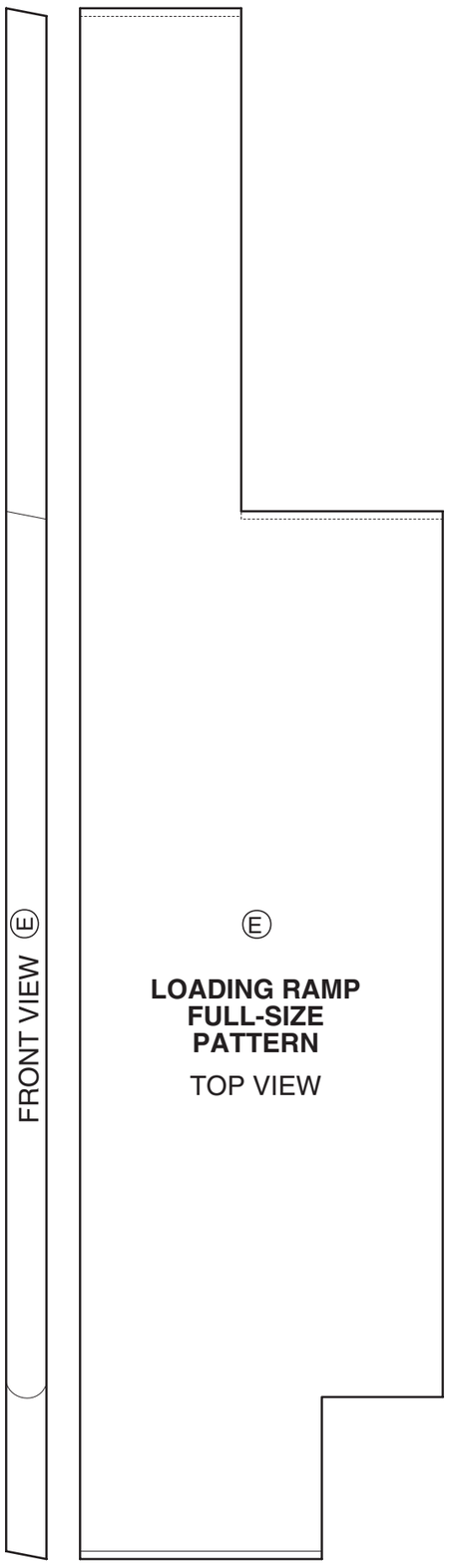


NAUTICAL SHELF
PARTS VIEW
See page 40

GUM BALL MACHINE
FULL-SIZE PATTERN
See page 52
(See additional patterns on other side)



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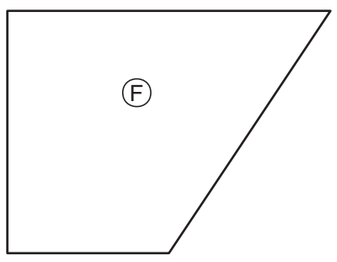
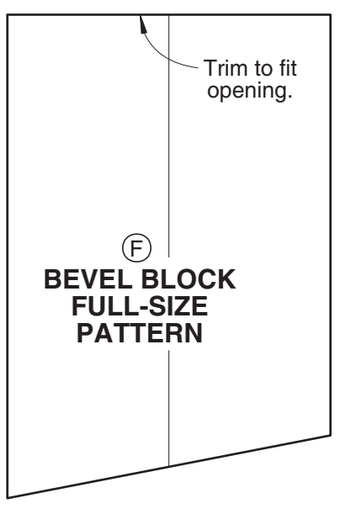
LOADING RAMP FULL-SIZE PATTERN

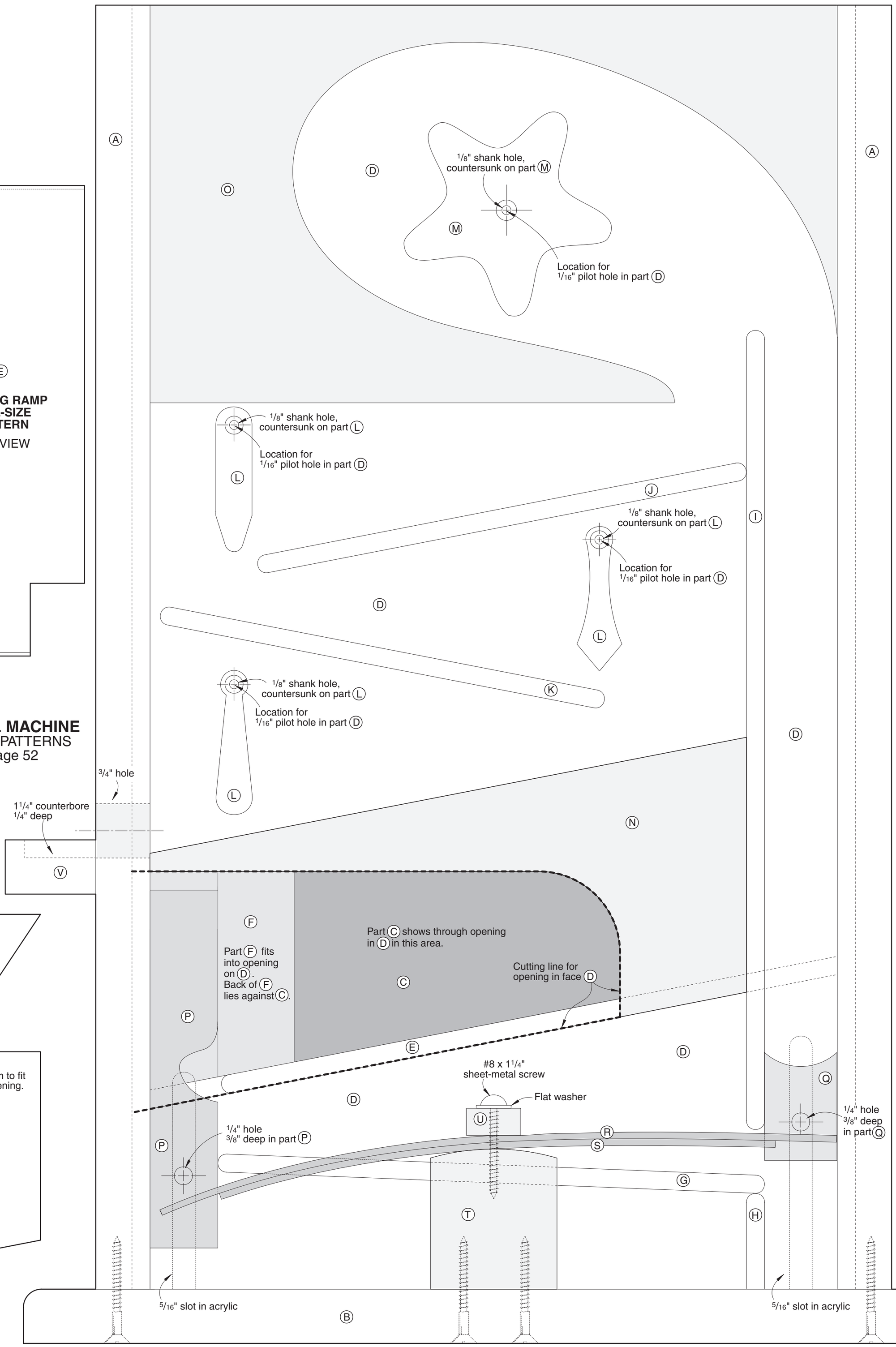
TOP VIEW

GUM BALL MACHINE
FULL-SIZE PATTERNS
See page 52



TOP VIEW



BEVEL BLOCK FULL-SIZE PATTERN

FRONT VIEW